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JOURNAL

OF THE

ROYAL HORTICULTURAL SOCIETY.

VOL. XXI. 1897.

PART I.

THE VICTORIA MEDAL OF HONOUR IN HORTICULTURE, 1897.

IN commemoration of the sixtieth year of the reign of Her Most Gracious Majesty Queen Victoria, Empress of India, Patron of the Society, the Council of the Royal Horticultural Society asked permission of Her Majesty to establish a medal, to be awarded solely *Honoris causâ*, for good work done in the domain of horticulture.

Her Majesty graciously assented to the proposal of the Council, and gave permission that the medal might be known as "The Victoria Medal."

The Council have therefore caused a new medal to be struck in gold, and have decided to confer it upon sixty horticulturists who have rendered eminent service in different branches of horticulture.

It is intended that the medal shall be held as a purely personal distinction in the realm of horticulture; and that it shall not, under any circumstances, be offered for competition, or used for purposes of advertisement.

The following are the names of the first sixty recipients of the Victoria Medal:—

Baker, John Gilbert, F.R.S., F.L.S., Royal Herbarium,
Kew.

Balfour, Prof. Isaac Bayley, M.A., Sc.D., M.D., C.M.,
F.R.S., F.L.S., &c., Royal Botanic Gardens,
Edinburgh.

Barr, Peter, King Street, Covent Garden.

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Burbidge, Frederick William, M.A., F.L.S., Trinity
College Botanic Gardens, Dublin.

Crump, William, Madresfield Court Gardens, Malvern.

Dean, Richard, Ranelagh Road, Ealing.

Dickson, George, Chester.

D'ombrain, Rev. H. H., M.A., Westwell Vicarage,
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Dunn, Malcolm, Palace Gardens, Dalkeith.

Ellacombe, Rev. Canon, Bitton Vicarage, Bristol.

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Foster, Prof. Michael, M.A., M.D., LL.D., F.R.S.,
Great Shelford, Cambridge.

Fraser, John, South Woodford.

Gordon, George, Endesleigh, Priory Park, Kew.

Heal, John, 10 Musgrove Crescent, Fulham, S.W.

Henslow, Rev. George, M.A., F.L.S., &c., Drayton House, Ealing.

Herbst, H., Stanmore, Kew Road, Richmond.

Hole, The Very Rev. S. Reynolds, Dean of Rochester.

Hooker, Sir Joseph Dalton, M.D., G.C.S.I., C.B., F.R.S., Sunningdale, Berks.

Horner, Rev. F. D., M.A., Kirkby-in-Lonsdale.

Hudson, James, Gunnersbury House Gardens, Acton, W.

Jekyll, Miss Gertrude, Munstead Wood, Godalming.

Kay, Peter, Claigmar, Finchley, N.

Laing, John, Forest Hill, S.E.

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McIndoe, James, Hutton Hall Gardens, Guisborough.

Milner, Henry Ernest, F.L.S., Dulwich Wood, Norwood, S.E.

Molyneux, Edwin, Swanmore Park Gardens, Bishop Waltham.

Monro, George, Covent Garden.

Moore, Fred. W., A.L.S., Royal Botanic Gardens, Glasnevin.

Morris, Dr. Daniel, M.A., C.M.G., D.Sc., F.L.S., Royal Gardens, Kew.

Nicholson, George, A.L.S., Royal Gardens, Kew.

O'Brien, James, Harrow-on-the-Hill.

Paul, George, The Old Nurseries, Cheshunt.

Paul, William, F.L.S., Waltham Cross.

Rivers, T. Francis, Sawbridgeworth.

Rothschild, Hon. Walter, 148 Piccadilly, W.

Sander, Frederick, St. Albans.

Schröder, Baron, The Dell, Staines.

Seden, John, Middle Green, Langley.

Sherwood, N. N., Dunedin, Streatham Hill, S.W.

Smith, James, Mentmore Gardens, Leighton Buzzard.

Smith, Martin R., Hayes Common, Beckenham.
Speed, W., Penrhyn Castle Gardens.
Sutton, Arthur W., F.L.S., Reading.
Thomas, Owen, Royal Gardens, Windsor.
Thomson, David, Drumlanrig, N.B.
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Weybridge Heath.
Wolley-Dod, Rev. C., M.A., Edge Hall, Malpas, Cheshire.
Wright, John, Rose Hill Road, Wandsworth.
Wythes, George, Syon House Gardens, Brentford.

MICROSCOPIC GARDENING.

By H. MARSHALL WARD, D.Sc., F.R.S., F.L.S., F.R.H.S.,
Professor of Botany in the University of Cambridge.

[Read March 9, 1897.]

I REMEMBER being much impressed by the accounts of the forests of fungoid vegetation described in some of the microscopic authorities of twenty-five to thirty years ago, and even now it seems difficult to view calmly such sketches as Carpenter's of the forest to be found in the stomach of a beetle, or Hogg's section of a grape, though the enthusiasm these figures evoke pales when compared with that stimulated by the magnificent drawings which the Tulasnes have given us of gardens and forests of microscopic fungi. It is everyday knowledge now that such forests of fungi and other microscopic plants can be seen on any piece of decaying vegetable or animal remains, but with increasing familiarity with the phenomenon we trace the origin and progress of quite different views as to the significance of these microscopic organisms.

Long prior to the time I have referred to, indeed, and even

dating from that of the earliest workers with the microscope, it was known that the water of pools and ditches, and especially infusions of plants, animals, &c., of all kinds, teem with living organisms; but it was not recognised definitely that vast numbers of these microscopic living beings—and even actively moving ones—are plants, growing on and in the various solid and liquid matters examined, as truly as visible and accepted plants grow on soil and in air and water.

Perhaps the most important discovery in the history of cryptogamic botany was initiated here.

But even then observers had to content themselves with wandering through the newly discovered forests and fields of vegetation, describing what they saw as accurately and fully as possible, much as I suppose travelling botanists had to describe tropical trees and orchids, &c., before we knew how to grow them. No doubt, I do not err much in assuming that many more rare plants were lost in the attempt to rear them in days gone by than are lost now that so much is known about charcoal and tree-fern supports, peat and composts, drainage and ventilation of pots, and the regulation of temperature, light, &c., of hot-houses. Well, the kind of change that has come over our knowledge of microscopic plants during this last busy quarter of a century has been almost entirely due to the initiation and improvement in methods of growing them—in the methods of microscopic gardening.

It will, no doubt, be conceded that if we were to become so big in proportion to our flower-beds and plots, plants and seeds, &c., that a finger-tip would cover the soil we sowed with seeds which our eyes could not see, it would, I say, be conceded that we should not be so sure as we now are that a wheat-plant comes from a grain of wheat, a cucumber plant from the flat seed so well known, or an oak from an acorn. As it is, we know these things because we have sown the seed and seen the product—or have good evidence that others have. But even as things are, I make no doubt it would be easy for any of us to puzzle another with some seed or other.

Now, those who explored the forests of fungi were in just the stage we should be in if the assumption of Brobdingnagian proportions spoilt our present relations of size to the seeds and soil.

Millions of 'seeds'—in the physiological sense—were discovered hanging on the trees and lying on the ground, but it was as yet impossible to sow them and watch them grow; the beginnings of microscopic gardening were not yet.

In the case of many introduced garden-plants inquiry into their history and habits shows that each has passed through some such phases as the following.

It was discovered by a traveller seeking for plants, but not concerned with, or not equipped for, any detailed botanical examination of the species.

Collected specimens were then sent home and carefully figured, and found their rest in an herbarium, properly named and classified.

Seeds or other suitable portions of the living plants sooner or later arrived, and were made the subject of experiments in garden or greenhouse, and grown; and as experience with such exotics grew more and more, special methods of treatment were found necessary, and varieties of cultivation soon followed.

Now, the history of microscopic plants and of the methods of microscopic gardening have been singularly like those of ordinary plants and gardening. Prior to 1850 microscopic algæ and fungi were being discovered by explorers in all directions, and enormous stores of figured and suitably prepared and labelled materials accumulated in collections. Then came one of the most active periods botany has ever known. Unger had discovered the spermatozoids of the moss in 1837, and Suminsky had explained the fertilisation of ferns in 1848, while Hofmeister's masterly treatise on the embryology of cryptogams appeared in 1849-51, and the names of Thwaites, Williamson, Carpenter, Berkeley, and other English workers are well known in this connection; but the microscopic algæ and fungi were still a chaotic mass of collected forms, with the exception of a few isolated observations. Thuret, in 1853, Pringsheim and Cohn, in 1855, and De Bary about the same period were initiating an epoch which may be said to be distinguished by the observer watching the living plant and noting its peculiarities of growth and development instead of merely collecting it and giving it a name. The publication of Berkeley's masterly treatise on cryptogamic botany in 1857 marks the critical period.

Spores of fungi especially were now sown and their germina-

tion observed, and the names of the brothers Tulasne particularly stand forth in connection with this new departure. Not that spores had not been sown before, our own revered Berkeley having been one of the earliest and most careful observers, but the period now ushered in produced men who determined to cultivate microscopic plants as other plants are cultivated, having gained the assurance that as long as you merely know a few facts only about a plant of any kind you remain ignorant whether it is useful or noxious, your friend or your enemy—and this, whether the plant is a fungus or a weed of higher growth.

It was De Bary especially who introduced the new era. He pointed out that some of us must leave off merely collecting and naming the fungi and other microscopic plants found by explorers; that it is also not sufficient to put the living fungus under the microscope, just as it is not enough with a higher plant to merely watch its growth mixed with all the weeds of its neighbourhood. What is wanted is—we must obtain its spores or seeds, free from weeds, and cultivate it from spore to spore, from seed to seed, in good soil and under the best conditions. And here came the rub. For it is extremely difficult to obtain the spores free from weeds, just as it is difficult to obtain pure the seeds of clover, grass, and other plants.

Moreover, it is extremely difficult to make the microscopic plant grow and flourish when you have got it; for, like higher plants, they need special conditions of soil or other substratum, light, temperature, ventilation, and moisture.

We all know how hopeless it would be to try cultivating a *Cuscuta* or *Lathræa clandestina* in ordinary soil; they need a living plant as a substratum. So it is with many fungi. We know also how *Rhododendrons*, *Saxifrages*, *Dionæas*, many orchids, ferns, bulbous plants, and so forth, need special treatment, and the same is true of fungi. Those who have the good fortune to successfully grow *Nelumbium*, *Victoria Regia*, and other tank-plants know that special conditions must be assured; so with numerous algæ and fungi. Consequently, we see, microscopic gardening became an art just as is horticulture.

Let us suppose we have a shallow thin glass dish, the bottom of which is flat. If we place in this a thin slice of potato, or pour into it a thin layer of gelatine to which a little sugar has been added, and leave it open in a room or outside, we shall

find in a few days that a number of moulds, yeasts, and bacteria are growing on its surface. The number and kinds of these will depend on several circumstances, of which the season, temperature, moisture, and locality are important on the one hand, and the composition of the exposed fungus-bed on the other.

Now these growths are weeds, from spores either wafted in from the air, or carried in by flies, &c., or contained in the bed itself, and the experiment is to be compared to one where a garden-bed of soil is dug over and left to nature, and which would soon be covered by weeds, the seeds of which are carried to it by wind, birds, &c., or were already lying there ready to germinate. If in either case we cover over the bed with a glass roof, we can keep out the air-borne seeds from outside, but those already in the ground will soon supply a crop of weeds. If, however, we go further, and kill all the seeds present in the bed to start with, by so arranging matters that we can heat up the soil with its glass roof on, then we can either keep the bed free from plants or sow any we choose. Now botanists had for some time been in the habit of streaking such a prepared bed with the spores they wished to grow, and then, as soon as the little thin streak of fungus-plants appeared, taking a small portion off on the point of a clean needle, and again sowing in a narrow streak, and so on till they got only one kind of fungus on the bed. This procedure was modified in various ways by different observers, and Brefeld as early as 1874 had succeeded in so distributing these spores in gelatine that he lifted up only one spore in a drop of the gelatine, and examined its further growth under the microscope.

Clearly we may compare these methods of microscopic gardening with the common procedure in ordinary horticulture of sowing seeds in long, thin rows, and hoeing out the overcrowded ones and the weeds, and with the practice of pricking out and transplanting of seedlings. With the fungus spores, however, it is generally a case of dealing with spores and even plants which are quite invisible, except under high powers of the microscope, and it was not till comparatively recent times that methods were so improved that we could select and transplant these invisible organisms as we now do.

I may best describe the principles of the present methods by taking that which I have for several years employed in my own

laboratory for the isolation, transplantation, and growth of fungi from single spores.

Having found a gelatinous medium in which a fungus will grow, we proceed as follows. A glass chamber with a very thin detachable roof is baked in an oven, and allowed to cool ready for use. The spores of the fungus are then shaken up in the melted gelatine-medium freed from other spores, so that they are separated and distributed in its mass, and the whole poured into a larger baked and cooled shallow glass dish, and allowed to set solid as a thin transparent film. This is kept covered, and every precaution taken to prevent access of spores from outside.

In a few days the tiny fungus-plants appear, scattered at intervals over the bed of gelatine, and if there are no other species appearing than the one sown, we know the culture is pure, and ready for transplanting.

A few of the spores from one plant are now again shaken up in the melted gelatine-medium and a small drop transferred to the thin glass roof of a little glass house. Here the gelatine-drop soon sets, and is so placed that it hangs down from the under-side of the thin glass roof, and since both the hanging gelatine-drop and the glass roof are thin and transparent the microscope can be focussed and the spore observed. If the microscope shows that the drop contains only one spore, it is now allowed to grow under the microscope, and all its changes can be followed for many days without danger of weed-fungi getting into the closed Lilliputian greenhouse.

Various modifications of this procedure are known, and many small precautions must be carefully followed, but we see that here is a method of growing a microscopic plant in a minute artificial bed of prepared soil, and studying its behaviour in a closed miniature greenhouse, the temperature, moisture, lighting, and ventilation of which can all be kept under control—a veritable method of microscopic transplanting and greenhouse culture in fact.

Of course it is troublesome, and often difficult and tedious; but the splendid results that have been obtained by patiently persevering with these and similar procedures have quite warranted the steady development of these methods of microscopic gardening.

Many practices of the gardener to 'force' flowers are known,

and I need only mention generally that especial attention is paid to a rise of temperature, exposure to light, the production of vigorous buds by 'high feeding,' and the avoidance of too damp an atmosphere.

Now recent developments in microscopic gardening have shown, especially in the hands of that clever worker Klebs, that the production of the fruiting organs in Algæ—organs which correspond physiologically to the organs we wish to obtain in flowers—is very definitely connected with the action of such factors of the environment as temperature, light, moisture, and food-materials. The principal points of importance in these experiments with the lower microscopic plants, however, consist in the fact that the plants themselves are simpler and more under control; that it is easier to vary one factor at a time and trace its action by changes visible under the microscope; and that the results occur quickly, hours and days taking the place of weeks and months or years.

Hence microscopic gardening acquires a very peculiar interest in connection with all studies which are directed to improve our knowledge of the culture of the higher plants, and therefore appeal to horticulturists very directly and especially.

Microscopic gardening is by no means confined to experts in botany and laboratory methods, however, and certainly one of the best lessons I ever had in this branch of gardening was given me by an old gentleman who for many years had had charge of the hybridising department of one of our largest horticultural firms. He showed me, with great patience and kindness, how he selected pollen and transferred it to the stigmas of the flowers he was operating with, and the precautions he took to prevent certain visitors from rival firms—chiefly bees—from entering his preserves and sowing foreign germs (*i.e.* weed-pollen) on his pet microscopic culture-beds (*i.e.* stigmas), and I remember being much impressed at the time with the thought that the bees and flies and other insects, of which Darwin has written so beautifully and to such splendid purpose, are really the oldest practitioners of this ancient art of microscopic gardening.

For such it is. In artificial cultures the laboratory gardener has now shown that when a pollen-grain is sown in the sugar-solutions which moisten the stigmas of flowers, it absorbs water and oxygen, feeds on the sugar, and grows, just as a seed may

be grown in water until all the reserves are used up: it puts out its pollen-tube exactly as it does when planted by a bee or by the hand of a horticulturist on its natural bed—the sugar-laden stigma—and years of patient research have shown that as this pollen-tube grows down the style into the ovary of a flower, it does the same: growing at the expense of the sugary juices offered it by the style it succeeds in growing long enough to carry its contents to the ovules—the future seeds—and we know what important effects follow according as we sow good or bad pollen, that from choice varieties or that from the wrong flowers. Hence the whole art of fertilising and hybridising flowers really consists in microscopic gardening.

If this required further proof than I have given, nothing is more conclusive to my mind than certain results obtained a few years ago by the Russian observer Woronin. He found that in many bilberries the fruits, though apparently formed normally, shrivelled up as they ripen to a black mass full of a fungus. On tracing the life-history of this fungus it turned out that its spores—*i.e.* what correspond to seeds—have a faint violet odour which attracts insects, and some of the spores are carried by the insects to the stigma of the bilberry and there sown, mixed with pollen brought by other insects, or by the same, from bilberry flowers.

Now, the fascinating point in this history is that we have here clearly a case of microscopic gardening where the prepared bed—the stigma—receives its normal sowing of pollen, together with a greater or less proportion of weed-spores, and the latter justify their name inasmuch as they, like true weeds, grow so much more quickly and vigorously that they soon occupy the whole area, and, growing down the style, reach the young ovules and devour them, and convert the whole fruit into a mummy filled with fungus.

The following is a still more extraordinary case of microscopic gardening, with so much appearance of purpose in it that one would be justified in hesitating to accept the details were they not vouched for by such excellent observers, and worked out in such detail by competent men.

Bates in 1863, in his travels on the Amazon, was struck like other observers by the enormous numbers of leaf-cutting ants, which cut bits out of the leaves of all sorts of trees and carry

the bits to their holes, and he not unnaturally asked, 'What do the ants do with these bits of leaves?' Belt, another English traveller in the same region in 1874, suggested that the ants make beds of leaf-mould in their underground passages, and use as food the fungi which grow from these prepared mushroom-beds. Of course the idea of ants turning gardeners in this way was laughed at, though a little inquiry will show that ants, bees and wasps, do carry out many other operations quite as remarkable.

However, it turns out that Belt was right, for in 1898 Möller published the results of his careful observations extending over several years, and showed that the ants not only build up the bits of leaves into definite garden-beds, but they foster the growth of the fungi which spring from spores attached to the leaves, carefully weed out foreign forms, and regularly harvest the crop for food. Not only so. Möller himself sowed the fungus in microscopic gardens, obtained the crop and found out what species it was, and proved that the ants were better hands at microscopic gardening than had even been imagined, for during the course of ages they have selected and bred a special variety of the fungus, so peculiarly close, short, and juicy that it reminds him of the cauliflower varieties of our own cabbages, and he names it the 'cauliflower' variety.

Here is microscopic gardening on a refined scale, and although we must not be led away in our ignorance into unfounded speculations as to the motives or objects—plans, if you like—of the ants themselves, the success of their communistic efforts in market-gardening on a microscopic scale cannot be denied, and may teach many a lesson to the thoughtful who reflect on how often a little intelligence is employed on cultivations on a much bigger scale of commercially useful plants.

It will probably occur to most of you that brewing is one of the most ancient of all forms of microscopic gardening, and it too has a history of development from the mere accidental exposure of decoctions of vegetable origin to fermentation, advancing to the refined pure cultures of special races and varieties of yeast in carefully prepared worts and musts of the present day, just as gardening and agriculture have progressed from the rough clearing of unweeded patches about the homestead to the scientific preparation of soils and manures and the selection of pedigree-

seeds properly sown and tended by the highly trained experts of to-day.

Brewing, in the broad sense of fermentations of wine and other spirituous liquors as well as beer—is still carried on in a most primitive way by savages, and even by other peoples. Not to dwell on the manufacture of pulque, palm-wine, &c., where the saccharine juices of plants are merely exposed to the action of any spores that may be floating about in the air, trusting to the particular one needed being in sufficient abundance, or growing with sufficient rapidity and vigour in the liquid, to oust all others—passing over these cases, I say, the manufacture of wine and beer has for centuries been a more or less hap-hazard affair, just as that of mead used to be. But of late years two sets of events have rendered the application of the methods of microscopic gardening necessary especially to the brewers of beer. One was the discovery that certain faults in beer—in some cases destructive diseases—are due to weed-yeasts making their way into the vats and driving out the yeasts that do the necessary work, and the other was the hope of raising varieties or races of the yeast-plant which should give a better beer.

Pasteur long ago called attention to the fact that foreign germs—*i.e.* weeds in the sense of my theme—cause diseases in beer, and Reess and others showed that there are various kinds or species of yeast; but it is to the genius and industry of the Danish zymotechnologist Hansen that we owe most of the numerous discoveries of weed-yeasts and of various species and varieties which produce beers of very different quality.

The interest of all this to us at the moment is that these results were got by the rigorous practice of the methods of microscopic gardening—by isolating a single cell of the particular yeast to be studied, growing it singly on a specially prepared bed kept free of microscopic weeds, and growing from this single cell a pure crop so large that it could be put into the mash-tub and its beer-producing qualities tested.

This is not the place, nor have I the time, to enlarge on this subject; but microscopic gardening operations applied to yeasts are spreading rapidly, and affecting the baker who wants good yeast for his bread, the housewife who wants it for her pastry, as well as the brewing industry all over the world.

To horticulturists, however, these matters do not appeal so

directly as do many of the results obtained by different paths of inquiry which branched out from the more special questions just touched upon. The researches of De Bary, Brefeld, Cohn, Pasteur, and their pupils had at various periods since 1860 led to much investigation of the contents of soils. Among other matters it was soon found that common garden and field soils abound in the spores of fungi, yeasts, and bacteria, and a natural inquiry was, what are these organisms doing in the soil?

Vittadini in 1852, and Brefeld and Klebs subsequently, invented and developed, and Koch and others have improved, a method of microscopic gardening which has led to most astounding results in these directions, and I cannot resist giving you a slight summary of some of these valuable and suggestive results.

The old Greek naturalists thought that the food of plants was elaborated beforehand in the earth, as in a stomach, and it took centuries of work to establish the fact that what the ordinary plant takes up by its roots in the absorbed water is only mineral matters of the ash, constituting but a minute fraction of the food-materials of the plant (absolutely essential, however), to be worked up in the leaves with the far larger quantities of gases there taken in and assimilated in the chlorophyll apparatus by means of energy obtained from the sun.

It was part of the price to be paid for rescuing the physiology of plant-nutrition from the grip of the old ideas of Aristotle, in the disastrous more modern form they had assumed in 1835-40 when the humus theory held sway, that soil came to be regarded as merely a mineral medium of value to the plant in proportion to its contents in certain chemical salts.

Soil, as we now know, is really an extremely complex medium. It is true the substances it affords to plants—I am speaking of ordinary green plants—are entirely the small quantities of mineral salts needed for the ash constituents, and forming only about 1 per cent. to 2 per cent. as a rule, or a little more, of the whole dry weight, the rest coming entirely from the air; but since these mere traces of mineral salts are to be found in practically every soil it is clear that their presence or absence is by no means the determining factor of the value of a soil. The structure, porosity, capacity for retaining heat and moisture and various gases, and a score of other physical properties, are now known to be far more important factors in most cases.

During the slow course of evolution of our knowledge of soil, as investigations multiplied and improved, and as it became more and more certain that a mere chemical analysis of a soil taught far less as to its value than had hitherto been assumed, it became more and more noticeable that soil is a complex of much more than so many bits of rock and chips of rotting leaves and wood: it teems with microscopic living beings—nay, it is, so to speak, *alive* with living organisms.

A thimbleful of garden-soil contains so many millions of microscopic algæ, fungi, bacteria, infusoria, and other living beings, that the brain reels in the attempt to figure them swimming in the films of water lining the interstices between the particles of sand, slate, granite, clay, wood, straw, dung, bones, insects' legs and scales, and other tiny bits of dead things, to realise that they are consuming oxygen and giving out carbonic acid and other excreta; that they are living, growing, and feeding, and reproducing, and in their turn dying, and that in the myriad turmoils of their existence they are inducing changes in the soil, so continuous and so varied that in spite of their minuteness in detail, the changes must be vast indeed in sum.

After the fact had once been realised that the soil swarms with living organisms, attempts were soon made to arrive at some ideas as to their numbers and distribution.

Shortly put, it was soon found that the greater numbers by far are just beneath the surface, at a depth of a few inches to less than a couple of feet, and that these numbers rapidly diminish as we descend, till few or none occur at 3 to 6 feet down. In other words, these soil-organisms predominate just where the principal absorbing roots of our ordinary plants are at work. The numbers differ in different soils: a sandy soil may have only about 1,000 per thimbleful, where a garden-soil will contain 10,000,000 or more, and the soil of a street up to 60 or 70 millions: they are also more numerous in summer than in winter, and in moist warm climates than in dry cold ones, and so on.

Now the question at once suggests itself what are these tiny beings busy about; and how do their doings in the neighbourhood of the absorbing root-hairs affect the plants of our gardens, fields, and forests? For we cannot possibly suppose that they exert no action on these. Microscopic gardening alone can

guide us to solutions to these questions, and it is by selecting out the single forms, cultivating them in our microscopic garden beds, watching their habits, and learning what they are about, that we have succeeded in answering some of the questions regarding a few of them. Some questions only, and regarding a few of these minute beings only—I use these expressions advisedly, for we are only at the beginning of the inquiry, now actively going on in several quiet laboratories.

The results already obtained are so startling and important, that one wonders that the whole world of agriculturists, gardeners, and foresters, does not at once turn its attention to stimulating further research into these new fields of practical inquiry.

In the first place we find a series of these organisms whose whole life-functions are devoted to getting rid of the bits of stick, dead leaves, and roots, pieces of paper and rag and other forms of the substances known to chemists as cellulose and allied bodies, converting them gradually into gases such as carbonic acid and water, and so ridding the heavy-laden earth of a burden so great that a very simple calculation shows that if they accumulated unchecked there would soon be no room for man on this planet. For it is quite a mistake to suppose that ordinary plants can directly utilise these things.

It has recently been shown that mud contains organisms which, put under conditions as closely as possible resembling the natural ones, will dissolve paper—and you remember paper is only one form of cellulose or plant-fibre, and there can be no doubt that these forms are active in every manure heap, sewage farm, marsh, refuse heap, and in cultivated soil.

Another form has been separated and grown in microscopic gardens, the function of which is to convert urea, which is useless to the higher plants, into certain salts of ammonia which are or can easily be rendered very valuable to them, and without the co-operation of these organisms the urea put on to land in stable-manure, sewage, and in other forms, would be of no use to cultivators.

A recent authority has calculated that, putting the number of human beings at fifteen hundred millions, each excreting twenty-five grams of urea daily, there would be 37,500 tons of urea per diem to be got rid of, or to accumulate. If we add to this the

quantities accumulating from other animals, which must be far greater, it is easy to see that whether regarded as locked up nitrogen, or as merely accumulating material, the blocking up of the earth's surface, so far as man is concerned, would be rapid.

Another set of soil organisms are found to bring about the oxidation of ammonia salts to salts of nitrous and nitric acids, forms in which they are even more available to the roots of the higher plants. They thus supplement the action of those organisms which convert urea into ammonium salts, as well as those of a large class of forms which convert organic nitrogenous bodies such as horn, hair, and other animal remains, and the *débris* of plants into ammonia.

These nitrifying organisms are among the most interesting and important of all the soil-organisms, and the ingenious methods of microscopic gardening which have led to their isolation and culture have opened up entirely new vistas into unknown regions in plant physiology, as well as thrown brilliant light on hitherto obscure problems in practical agriculture and horticulture. Equally important are the discoveries recently to hand concerning a series of minute soil organisms, which, alone or in symbiosis with Leguminous or other plants, fix the free nitrogen of the air, and of others which undo the work and set nitrogen free again, so that our picture of the cycle of nitrogen in nature is now fairly complete in its outlines, a fact the significance of which only attains its proper proportions when we know how difficult that problem was in the past, and how far-reaching its consequences are.

These are only a few of the results already to hand. Microscopic gardening has unearthed the forms which cause the rotting of flax, the decomposition of sulphur compounds and iron-salts, and which bring about numerous other changes in soil; it has also brought to light all kinds of disease-germs—forms fatal to man and other animals, as well as to plants, of which I may mention “finger and toe,” the “smuts” of corn, damping off of seedlings among others. It has taught us to appreciate, even more in detail than Darwin's beautiful book had already taught us, the enormous influence of earthworms in soil, for these animals bring up from depths at which they are inert and useless, germs which can again do their work at the

higher levels of the soil—which reminds us that earthworms, like slugs, ground-beetles, and other relatively large soil-animals, are active, if unconscious, microscopic under-gardeners, whose actions profoundly affect the distribution of the various soil organisms. But here I must stop, or the mere recital of the little that has yet been accomplished, judging from its comparison with the indications of what is coming in day by day, will carry me beyond the scope of a lecture to a trial of your patience, for which I have no desire to incur responsibility.

The first record I can find of microscopic gardening which applies to the culture of parasitic fungi, is due to an Englishman named Marshall, who in 1782 tested the belief that barberry bushes were in some way responsible for the rust of wheat, and found that the wheat was rusted in proportion to its proximity to the plants.

It is true Marshall knew nothing of the nature of the fungus, and that his experiment can at best be compared to one where we prepare a bed near some weeds and see what will come; but I think this Norfolk gentleman should have his memory credited with the honour due to a scientific idea, for it was a scientific experiment in agriculture on a microscopic scale.

Willdenow in 1804 went a step further, and streaked the yellow spores of the barberry fungus on the leaves of a grass and some other plants; and Hornemann in 1814 dusted the spores on leaves of wheat, rye, and other cereals. Gmelin had named the fungus on the barberry in 1786, and Persoon those on the wheat in 1797 to 1801, but it is evident that no clear ideas as to their nature were then possible, and we must look upon the experiments as not so much definite attempts to grow microscopic plants, as rather the exposure of the selected seed-beds (the leaves) to mysterious influences to see what would come. In most cases nothing came; but in 1816 Schöler, and in 1818 Bönninghausen, did infect grass leaves by dusting them with the barberry rust.

In 1864 we meet with a very different case when De Bary not only sowed the spores of wheat rust on the barberry, and obtained a crop of barberry rust, but he observed the germination of the spores and ingrowth of the fungus on the leaves themselves. De Bary had already in 1861 observed the entrance of the germ-tube of *Phytophthora* into the potato plant—the

first direct proof of such infection. Here we may compare the method with that where we not only prepare a proper sowing bed, and sow seeds on it which we have reason to believe may germinate and produce a crop, but to make sure that it is really the seeds we have sown which produce the crop, we take up the germinating seeds at intervals and study their growth stage by stage. We are apt to forget the importance of this, and to overlook the fact that if it were necessary to justify our assertion that a grain of wheat gives rise to a wheat-plant when sown, exactly the same rigid procedure would be demanded, and if we remember that prior to 1848 the prothallus of the fern was regarded as its cotyledon, it comes home to us how necessary strict methods are in microscopic gardening, even with relatively large plants.

De Bary, by the application of his new mode of microscopic gardening, demonstrated two facts—the entrance of the germ-tube of the parasite into the host-plant, and the wonderful phenomenon of Heterœcism—that is to say, a parasite growing in the tissues of one host-plant, such as a grass, develops in one way, but in the tissues of another plant, such as the barberry, it produces quite a different fungus; and every year since has served to confirm the accuracy of his results.

Oersted in 1865 showed by a similar method of microscopic gardening that the *Gymnosporangium* on the juniper, if sown on the leaves of a pear, develops into quite a different fungus called *Roestelia*, and similar observations have been repeated over and over again by such excellent microscopic gardeners as Mr. Plowright, the late Major Barclay, Mr. Soppit, and others—indeed, we have some reason to be proud of our countrymen as microscopic gardeners in this direction.

The methods of culture just referred to can evidently be best compared with the sowing of seeds in specially selected or prepared beds; but there is another way of conducting the microscopic gardening operations with these parasitic plants, first introduced, I believe, by Robert Hartig in 1878. In cases where a parasitic fungus is growing in the wood of a tree, a piece of the infected wood is cut out by a boring tool, and inserted into the wood of a sound tree; the fungus here grows, just as does the mycelium of a mushroom when the “spawn” is put into a properly prepared bed. In these cases we may compare the

operation to that of transplanting or bedding-out cuttings, rhizomes, stools, bulbs, &c., in contrast to that of seed-sowing, and some very valuable results have been obtained by this method of culture.

The application of De Bary's methods to the study of parasites of the grasses and cereals has yielded some very remarkable results of late years, especially at the hands of Eriksson and Henning. These experimenters have examined the behaviour of rust on 105 species of grasses, and have found that just as we have varieties and races of the higher plants, so with *Puccinia graminis*, the fungus of wheat-rust, there are several distinct varieties which behave very curiously. For instance, the variety which infects the barley will not infect oats or wheat, but will grow on rye and twitch; that on oats refuses to infect wheat, and conversely; that on *Aira cæspitosa* is different again, and so is that on *Poa*. Nevertheless, all these form-species or varieties will grow on the barberry, and since they are practically indistinguishable under the microscope we are driven to the conclusion that it is owing to some influence of the host-plant on the physiology of the fungus that it has thus become specialised in its parasitism.

If these were the only cases where the fungus is found to have become so closely adapted to the conditions of its natural seed-bed, I might be tempted to pass over the matter as too speculative to bring before you; but it is not so, for, in addition to other species of *Puccinia*, we know that such specialisation applies to an *Aecidium* on the spruce, as De Bary found in 1879, to a *Peridermium* on the pine, as Klebahn showed in 1892, to several forms of *Gymnosporangium* on junipers, as Mr. Plowright has shown, as well as other observers; and to *Ustilago*, according to recent researches by Swingle and others. That we are here face to face with phenomena of the same order as those where races or varieties of yeasts are formed by cultivation, and of bacteria by variations in the conditions, may safely be asserted; but I would go further than this, for it seems to me that the phenomena also come into the same category as the variation of plants like the cabbage, Indian corn, wheat, potatoes, &c., on the one hand, and the specialisation of the pollen in heterostyled and other flowers to certain stigmas, on the other.

But there can be no doubt that among the most important

results to horticulture and agriculture, obtained by microscopic gardeners, are those which have led to our modern suggestions for the practical treatment of diseases of plants.

So long as people believed, with Unger, that a parasitic fungus was merely a diseased exudation of the plant itself, no proper treatment could be thought of, and long afterwards, while men only knew that a parasitic disease was at work by the extrusion of the fungus-spores, it was impossible to attack the matter successfully, because the existence of the disease was not recognised till it had all but run its course—it was like calling in the doctor when we recognised the patient was dying.

As soon as the proof was forthcoming that a parasitic fungus has a determinable life-history, partly outside and partly inside the plant, however, it became clear that, provided we can catch the spores or fungus outside the plant, it ought to be possible to attack them. Even the earliest discoveries of De Bary and his contemporaries showed that this hope was not a vain one.

When it became clear that the “smut” of corn, the fungus of wheat “rust,” and the “mildews” of the rose, vine, hop, and potato, only dwell for a few weeks in the tissue of the host, and that before they establish themselves in these tissues the spores have to pass through a period of germination, in which their delicate germ-tubes are so exceedingly sensitive to external agents that the merest trace of acids or alkalies, or poisons of various kinds, kills them in a moment, it seemed obvious that all we had to do was to apply a selected “weed-killer” to the germinating spores.

Now you all know how comparatively easy it is to kill weeds on a gravel path, where no considerations for other plants need affect our calculations as to the kind of poison used, or the quantities and strengths employed; well, just in the same way the microscopic gardener, by applying antiseptics to his pure cultures, soon found that a mere trace of sulphurous gases, carbolic acid, copper-salts, corrosive sublimate and so on, at once destroys the baby fungus-plant as it emerges from the spore.

But when it came to applying such poisons to the spores germinating on the host-plant—*i.e.* on a rose, vine, hop, &c.—matters were complicated by the very biological conditions which render it much more hazardous to attempt any poisoning treatment on weeds in a lawn or in a flower-bed—*viz.* you run the

risk of the "weed-killer" destroying not only the weeds but also the grass and choice plants you want to save.

It is clearly not a philosophical, nor even a defensible, attitude of mind to rail at this inevitable state of affairs: Nature may be circumvented and ingeniously interfered with—cajoled, if you like—in various ways, but she will surely not be moved by vituperation.

Experts in microscopic gardening soon showed that in some cases at least success was possible.

As early as 1858 Kühn had observed that certain smut-fungi (Bunt) obtain access to the seedling owing to their spores adhering to the grain and germinating when it does so, and found that steeping the grain in copper-salts kills these spores without hurting the more resistant grain. The practice of steeping grain has now been carried to such perfection that very little Bunt ever appears now. It is important to notice that the intelligent application of these preventive measures depends entirely on a proper knowledge of the life history of the fungus and its relations to the host-plant, and this knowledge was only obtained by microscopic gardening. But the testing of the new knowledge by experiments in the open must be referred to the grower on a large scale, and we must not forget that only by experiments can these matters be tested.

But an even earlier application of the knowledge obtained by microscopic observations of parasitic fungi was the recommendation of powdered sulphur scattered over plants affected with mildew, by the late Mr. Berkeley, one of the ablest observers of fungi we have ever had.

The methods of applying remedial measures to plant-diseases have increased and varied much since those days, and although there is still much to learn, we have learnt much; but throughout the long story of accumulating experience the one truth steadily rings—all experiments with fungicides must be planned with due regard to a knowledge of the habits of the fungus and with intelligent interest in the behaviour of the host under treatment. The treatment which is efficacious in dealing with "damping off" of seedlings must be varied when we deal with "finger and toe," which Dr. Somerville and Mr. Massee have shown can be successfully combated by lime; and neither procedure will serve with "bunt" or "smut" or with the "potato disease," "vine

disease," or hop and rose mildews. Still different must be our procedure when dealing with "Dry-rot" and the various diseases of trees, and so on.

During the course of the investigations which have gradually perfected our knowledge of microscopic gardening, another aspect of the matter has slowly forced itself on our attention.

Even the earliest exact observations on the infection of plants by parasitic fungi raised the question as to the behaviour of the host-plant. Can we regard a living leaf or root, &c., as a mere passive soil on which the germinating parasite grows; or must we not rather assume that it plays a more active part in the matter?

Long ago De Bary, impressed by the remarkable behaviour of the infecting germ-tubes, hazarded the conjecture that the contents of the cells of the plant attacked must probably re-act in some peculiar manner to the invading organism, and some of the most wonderful results of twenty-five years of microscopic gardening have assured us that his conjecture was well founded.

Curiously enough, this aspect of the question first came into prominence during some observations on microscopic gardening made by Pfeffer in an entirely different connection. He found that when the zoospores of certain *Saprolegnias* congregate round a piece of fly's leg, or bacteria round a bubble of air or a piece of meat, or the spermatozoids round the mouth of an archegonium of a moss or fern, their movements towards these centres of aggregation were such as could only be explained on the assumption that some attractive influence compelled them towards the object they centred around, and he discovered in each case that a definite chemical body exerted the attraction. So complete was the proof, that Pfeffer could attract any of these organisms out of a mixture into microscopic tubes of the particular chemical which exerts this curious attraction.

Pfeffer's pupil, Miyoshi, then showed that fungus-hyphae are subject to similar chemotactic influences. If a fungus is allowed to grow in a microscopic garden-bed containing a mere trace or none of the particular chemical found to attract it, and another microscopic garden-bed at a little distance contains more of this substance, the fungus leaves the former bed for the latter.

Now the suggestive part of the matter comes in when we learn that just these particular attractive chemicals are formed in

the plants attacked by fungi, and the germ-tubes leave the outside of the plant, and penetrate into the tissues in obedience to this chemotactic influence; at least, there seems no other explanation of the curious phenomena witnessed, for it is possible to make a fungus which ordinarily is not a parasite enter into a leaf and become parasitic by artificially injecting the leaf with the attractive chemical, and we have reason to believe that in many cases of epidemics the disastrous onslaught of the parasite is in great part due to the fact that the cells of the host-plant are unduly charged at the time with such substances as I have referred to.

No less remarkable are the discoveries which microscopic gardening has elicited concerning the way the fungus attacks the solid cell-walls of the host-plant. Solvents of various kinds have been shown to be excreted from the tips of the fungus-tubes, which dissolve the cell-walls and enable the tubes to penetrate and pierce holes through what would otherwise be impassable barriers; and if a drop of such solvent be squeezed out, and a piece of solid cell-wall be steeped in it, the latter melts away under our eyes. As Professor Green has shown, similar bodies are produced by pollen-tubes, so that we now see how these pierce their way down the style of the flower.

Not because I have exhausted the subject, but in fear lest I should exhaust your patience, I am led to bring this sketch of the subject and results of microscopic gardening to a close. I hope sufficient has been made clear to show that gardeners on a large scale—by which I mean horticulturists, farmers, and foresters, as well as all who grow plants—are vitally concerned in the minute operations of microscopic gardening, for not only are investigators bringing to light daily discoveries of the highest importance to science as a whole, but results of the greatest practical importance; and I am sure you will agree with me that just as these gardeners on a minute scale have learnt, and still have to learn, much from your practice on a large scale, so you will find much of value and interest in their pursuits, which have to be conducted with a rigour and precision worthy of comparison with the most refined and difficult operations of modern culture, and demanding the highest scientific attainments.

BUD TRANSFERENCE AND ITS EFFECTS ON FRUIT.

By the Rev. GORDON SALMON.

[Read March 24, 1897.]

It has been wisely and well said that there is nothing new under the sun, and it has been stated again and again with equal truth that new methods are as old as the hills, a seeming inconsistency, which, as I am not as old as the hills, I can neither substantiate nor disprove; but if the proof of the pudding is in the eating, I can very easily prove that old methods, at any rate, may be made to produce new results, and that, if so, the results are worth our consideration. We hear a good deal in these days about the introduction of practical chemistry into farm cropping, and that the cry is if the farmer of the immediate future is to prosper, he must be content to march with the times, or otherwise be no less content to lag behind in the stirring push for progress in the intensely interesting position of a cultivator of the soil. Competition for the prize of supremacy is so keen, so thoroughly racy, that in order to hold our own we must, with ever-increasing energy, guide our hands more by the head than we have been in the habit of doing, and less by a sort of rule of thumb. Now what applies to farming, with equal force applies to her beautiful twin sister gardening, and the phases of work left to the enthusiast deepen in interest, through the practical results that may be obtained from the simplest of new methods. I am an enthusiast, and that by this semi-inspiration which enthusiasm means, I am quite content to stand or fall by the happy or unhappy success of fortuitous results. My subject then naturally divides itself into three parts:—

1st. Its methods.

2nd. The class of subjects on which the methods are applied.

3rd. Their results.

My subject then for development is essentially budding. I was first led to push my past and present researches to their present standpoint, through my ever deepening love of Nature, with the hope of reaching something that might be of practical use to my

more experienced and my more highly scientific brothers in our beautiful craft. As soon as we touch Nature we at once come into line with that which, to my mind, is sacred. Consequently development becomes more and more beautiful as the practical result grows and opens out like a bloom into perfection of form, and into increasingly fair promise of fruitfulness. The interest naturally begins with the insertion of the scion into its healthy stock. The stock must be sound if the result has to be in the slightest degree satisfactory; if the tree is good under given healthy conditions, by-and-by the fruit will be good also; if not, look not for results. These are truths as old as the hills; these are facts we need not be afraid to state. My simple method—and what a glorious beauty there is in simplicity—consists in the introduction of scion buds into stocks of known beauty, both as to form, colour, and taste or flavour of fruit, particularly flavour, for as it has been said as to the form divine, how often pretty faces have pulp for brains; so too in fruit often the fairest are the faultiest, and that where we have looked for the sweetness of success, we have only found the crude acid of disappointment; but, after all, this is only natural in the somewhat crabbed and contrary region of patient research into the mysteries of Nature's legion prizes of richest value. Of one thing, however, we may be certain, whatever the method we adopt for the nonce, in the mode of investigation we shall have, through the natural force of circumstances over which we have no control, to wait, so that the choice of a stock is of paramount importance, for with its vitality and freshness and lusciousness of sap will depend the prompt response of the scion bud, the instant union becomes most markedly sensitive and most perfect in its sympathetic work of change. Consequently the buds cannot be too full of life, and I think if we could only by some system of natural pressure create almost an overflow of fluid, it would materially add to success; but besides the healthiness of the stock we must add the maturity of the stock, and this is a subject which all know perfectly well, as one of the chief, if not the chief essential in the matter of obtaining a quick return. They who plant pears plant for their "heirs" is a very good saying, because time has proved its truthfulness, and it has doubtless become the popular motto for the practical fruit-grower not to deprive the heir of his, or Nature's heritage, but to see how he can easiest

become a quick partner in an early healthy and abundant return himself. As we intelligently gain a mastery of the position, and obtain a thorough experience in these essential ranges of fruit culture, so will our interest deepen from the first formation of the bloom bud, until the fruit is matured a year afterwards. I have laid it down as an axiom or established principle, that chemistry must have in the future as much to do with successful fruit culture, as in any and every form of farm work. Now what appears to me to be of most interest for the chemist of the present day—I am not a chemist, and I am too old to take up so wide a range of inquiry as the scientist in chemistry has before him—but I am certain that if judicious crossing has to reach the glorious position of obtaining improved varieties by the transference of the superior qualities of first-class fruit, as to form and flavour, the lengthened season of superior, and fine looking fruit, I can see most plainly that they are easily within its immediate grasp, and that it must be very largely obtained, through the careful and thoughtful blending of the juices, for I take it, that juice is not merely the characteristic fluid produced by an excess of moisture, but that which produces its own saccharine through the influence of sun power not merely on the fruit, but likewise by happy action on bole and branch and twig in its passage through its larger or lesser ducts, by which the fluid in its slowly ripening sweetness centres at last in all its glory in the perfect fruit. This, I think, will no doubt be a subject of paramount importance for the scientific fruit-grower of the future, for I feel sure there must be a way lying within easy reach of the skilled investigator, not only to obtain new varieties of choice fruit in this way, but, what may be still of greater value, of giving the finest kinds greater vigour, greater endurance, and so more resisting power to the climatic influences which we in our happy island home have constantly to contend with. It is not merely the soil that has to be considered; a good strong workable loam will, as far as soil proper is concerned, produce as good fruit as you can wish to see; neither is it its great depth that insures perfection, though granted it is a magnificent permanent home for healthy root action where this anchor of the tree is provided with such grand feeding ground, it is the sun action on the ground, it is the thorough ventilation of the soil which prevents morbid stagnation, and

enables the constitution of the tree to resist those wretched chills which I am sure produce just as much harm below as the action of the atmosphere in its intemperate moods works above ground. The properties of the soil and its health-producing assistants must be studied, the varied constituents promoting if not insuring success must be not too liberally applied; every appliance must be used in the way that Nature intends for development, for it is only in this way that fruit fibre can be produced in such quantity as every tree requires for the promotion of fair productiveness, for where there is fruit fibre there must be that on which alone it can satisfy its healthy appetite, and this will keep the tree from producing that worthless breast-wood in willow shoots, which none of us I am sure want, unless like myself only such as may be happily placed for cross budding, and thus creating increasing interest in the tree. We do not want more sap than the tree requires, but we want each and every tree well balanced; what it is enabled to produce, and likewise resist, through the intelligently judicious balancing of the roots with the tree, or if you like it better the tree with the roots. Canker, I am certain, is produced just as much from a lack of food for fruit fibre as from the root piercing downward with a greedy lust for rank feeding on the sour, cold clammy sub-soil, with its viscous matter which is the normal breeding ground of all forms of plant and tree diseases; but not only so, an excess of root-power creates in turn the same evil case above ground, for by creating a superabundance of morbid sap, the atmospheric action of our fickle climate upon every part of the tree, in its flood flow of sap in the early spring, bursts the overstrained, tender ducts, and canker again ensues. All safeguards must be provided, for I am sure without this balancing of the tree above and below ground, the tree will produce not fruitfulness but barrenness, not healthful but bastard growth, not fruit the glory of the show room and being a thing of beauty, the rapturous joy of admiring vision, but cracked and scabbed, at which a pig might be pardoned for turning up its nose. We want crispness, briskness, sweetness, and each condition may be gained by enlightened blending. I do not say perfection has been reached yet. I do not say as far as I have gone, in the intensely interesting and the intelligent widening of my knowledge in the ever varying object lessons nature so generously offers, that I

have more than entered the threshold of the treasures she has in store for those who make it their happy study how to draw from her treasures that which tends to promote fruitfulness, quality, and beauty in our national range of varied fruit. The glory of success must be therefore the aim and object of the enlightened fruit cultivator, and though the orchard house must ever be able to produce the finest fruit perhaps in appearance; for the true encouragement of the less favoured through want of shelters for their fruit trees from the keenness of our spring storms, it may not, nay, it cannot be the best in true natural flavour or in the exquisite richness of tint and tone of colour, given a favourable season. If we could only guard our trees from frost in the season of blooming and fertilisation, and the tender and interestingly delicate setting stage, I am convinced the varying moods of our fickle weather, given too sufficient sun-power, the humble cottager could easily compete with the squire, and dear Old England with foreign countries. Of course that period of anxiety when the process by which the pollen renders the infant fruit fertile must essentially be the most critical period, and all our brothers of the craft know only too well how often our fondest hopes have been dashed to the ground by the advent at that most trying moment of a cruel frost-devouring night. I have smelt in the lovely blossom of a tree, anyone might be pardoned for glorying in, the flavour of the fruit promised, and the next night all has been cruelly devastated and lost as if by a devouring fire, and the tree itself wrecked and ruined, save for tender care and intelligent after-thought and watchfulness; so then to mitigate as far as possible such a sad catastrophe I repeat the balancing of the roots with the tree must never be lost sight of, otherwise we help the elements to work that painful havoc among our trees that it will take us years to remedy, if hope in regard to such a happy result is not irretrievably lost.

The process of budding is simple in the extreme, and the trees under my watchful care are all, with only one exception, of mature growth; some in fact are what I might call old, and it has been with these that I have for years carried on my system of budding with the one wish of rendering them fruitful and the fruit of finer quality. I am sure I cannot say how many years I have been engaged in the work, but quite long enough to speak

as confidently as I have as to results; for what I have noticed in my researches is that budding seems to inoculate the tree, and gives it increased vigour; it seemed to me such a wretched waste of wall to have a grandly trained tree producing fruit only at the extreme end of the branches, and leaving the middle of the tree to produce year after year a perfect plague of breast-wood. I was recommended or encouraged to cut away the great spurs and lay in the young wood, but that I found of no use, so I took to budding the willow shoots all along the line of branches wherever I saw a favourable position, and the result has been marvellous; the mature growth of the tree at once sets the growth from the buds into fruit-bearing power in the course of two or three years, and the crops of fruit have been simply wonderful; in the case of one tree, an old one, with a west frontage, I have about nine different kinds of noted varieties, and year after year they have a beautiful display of blossom and a fine array of fruit, and last year the parent tree had not a single pear on it. Whereas on the branches by budding there was some beautiful fruit, and it would have been extremely fine quality if it had not been for our wet and sunless season. From my experience I consider it a positive cruelty and waste of years to cut down an old tree—perhaps it is because I am growing old myself—far better to give it back its youth through generous inoculation, and it will reward you with a thorough good array of fruit, and what is more, you most certainly change the character of the fruit, and doubtless with double and treble crossing the method, though simple, will develop varieties of ever increasing productiveness and newness of shape, colour, and flavour.

2. But the class of subjects on which the method is applied are, or rather I should say may be, as varied as the known kind of first-class fruits. I would never put in any but the best kinds, and what I am aiming at is to create in known fruit of size and beauty of form, increased good quality and flavour. Of course this can only be obtained by happy chance in first budding, whereas in other cases the change can only come very slowly, though vastly quicker than raising young fruit trees from seed. I think I shall very soon have as fine fruit to name as any named fruit in the country. The varieties I now possess I do not think can be equalled, and given a good season, this spring

and autumn will be the finest I have ever had. My trees are the wonder of the neighbourhood, and though we are situated in the Vale of York, with a severe winter temperature, and in summer, given sun-power enough, to create an ample quantity of saccharine, the sugar of fruits, as it is said, which is the freight they pay to birds to have their seeds carried afar upon their wings. Quantity and quality is what I am anxious to obtain, and naturally enough, for it is in this way that the trade is supplied and the public benefited and satisfied. Quantity and quality, not of gross mis-shapen fruit, but with a comely form, if I may be pardoned saying so, a fresh soft skin, and with that improved bloom the cultivator ever endeavours to produce, and is in wild raptures with when he has obtained it. I am very satisfied so far, and those most qualified to judge have expressed themselves astonished at the progress I have made; but I certainly think this year will open out more markedly the thoroughly practical character of the system. I shall very soon I hope be able to judge of the effect produced in obtaining briskness of flavour and a more powerful flavour accompanied with what I think I may call saccharine softness, in other words, a strength in flavour accompanied with softness and sweetness.

To sum up my remarks, I will only add :—

1. My method is that of budding noted varieties on mature noted stocks, and this must be done as early in June as the young wood will allow, for the earlier in the season the quicker the result. I have had a growth of three yards of a Jargonelle, budded on Broxworth Park in one season, not the season in which the bud is put in, for, as in rose-budding, I always like the bud to remain dormant, and then let it go on as quick as you like, or rather as quick as nature orders, and then you ought to have fruit in two years' time with the certainty of having a good growth of wood and an array of bloom-buds year after year, and, given a merry season of sunshine and shade, rain, mist, moisture, and drought in proper proportions, fruit, not merely to rejoice the eye, but likewise make glad the heart of man through the perfection of flavour. Say, bud this June, 1897; next April, 1898, growth will begin, and in the early or late autumn of 1898 you may have a few fruit, with the certainty of a much larger return the following years.

2. In regard to the subjects I have treated—not one of them

do I consider to have been a failure—here are their names in quantity. I am speaking before a world-known society, and I naturally as a humble amateur wish all to know what I have done with the hope, ever a rich grace in the enthusiast, that my amateur brethren of the craft, together with my more enlightened and scientific members may, by our joint action and continued investigation, produce year by year something new from methods as old as the hills:—

Pitmaston Duchess, budded on Marie Louise.

„	„	Thomson's Pear.
„	„	Doyenné du Comice.
„	„	Winter Nelis.
„	„	Autumn Bergamot.
„	„	Beurré D'Aremberg.
„	„	Beurré Diel.
„	„	Catillac.
„	„	Dr. Trousseau.
„	„	Souvenir du Congrès.
„	„	Glou Morceau.
„	„	Huyshe's Prince of Wales.
„	„	on Huyshe's Prince of Wales, recrossed on Souvenir du Congrès.

Winter Nelis, budded with Duchess D'Angoulême.

„	„	Louise Bonne of Jersey.
„	„	Jargonelle.
„	„	Souvenir du Congrès.
„	„	a pear bud obtained from a friend, which is extremely good.

Glou Morceau (old tree), budded with Doyenné du Comice.

„	budded with	Beurré de l'Assomption.
„	„	Brockworth Park.
„	„	Pitmaston Duchess, and crossed again.
„	„	Gratioli of Jersey.
„	„	Pitmaston Duchess crossed on Huyshe's Prince of Wales.

Swan's Egg (old tree), budded with Doyenné du Comice.

„	budded with	Louise Bonne of Jersey.
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Swan's Egg budded with Gratioli of Jersey.

„	„	Jargonelle.
„	„	Beurré Diel.
„	„	Dr. Trousseau.
„	„	Souvenir du Congrès.
„	„	Pitmaston Duchess crossed on Huyshe's Prince of Wales.
„	„	Thomson's Pear crossed on Winter Nelis.
„	„	Brockworth Park.

Baronne de Mello, budded with Thomson's Pear crossed on
Winter Nelis.

Brockworth Park, budded with Jargonelle.

„	„	Doyenné du Comice.
„	„	Jargonelle crossed with Pitmaston Duchess crossed on Doyenné du Comice.

Josephine du Malines, budded with Thomson's Pear crossed on
Winter Nelis.

„ „ Pitmaston Duchess.

Hacon's Incomparable, grafted with Duchess d'Angoulême, budded
with either Pitmaston
Duchess or Souvenir du
Congrès crossed Winter
Nelis.

„ „ William's Bon Chrétien.

„ „ Louise Bonne of Jersey.

Marie Louise, budded with Jargonelle.

„	„	Beurré de l'Assomption.
„	„	Gratioli of Jersey.
„	„	Louise Bonne of Jersey.
„	„	William's Bon Chrétien.
„	„	Souvenir du Congrès.
„	„	Pitmaston Duchess crossed with Doyenné du Comice.

Winter Nelis, crossed with Souvenir du Congrès, recrossed with
Pitmaston Duchess crossed on
Doyenné du Comice.

Beurré Sterckmans, grafted with Beurré Bachelier recrossed with
Doyenné du Comice.

shade, deepening in tint and tone as its still fairer cheek became more and more beautiful as it became more fully exposed to the action of the sun, when it reached a beautifully toned shade of bronzy brick-red. I repeat I have never seen three such lovely fruit; but, of course, you Southerners, rejoicing in greater sun-power, must remember I live in the Vale of York, and the flavour was most certainly quite equal to the fair form, colour, and bloom of the fruit. An expert who saw it in its glory on the spur, turning to me said, "Where did you get that colour from?" and I jokingly said, "O, that's a question very easily answered. I gave them a little rouge." The three pears weighed $10\frac{3}{4}$ oz., $8\frac{1}{2}$ oz., and 8 oz. = $27\frac{1}{4}$ oz. Pitmaston Duchess, crossed on Glou Morceau, is a very sound, good fruit, improved in form, and partaking distinctly of the flavour of the parent stock, so I hope the fruit will be able to prolong its season. Beurré de l'Assomption, crossed on Glou Morceau, is a remarkably fine fruit, if the shape only improves, but it is an ugly shape and altogether a rough-looking diamond, nothing more could be desired as to the delicious softness and sweetness of its flavour. Brockworth Park, crossed on Glou Morceau, is a very good fruit, with very good flavour, and the appearance and the colour is distinctly pretty where the sun gets full power, but the position of the bud is not very favourable, being low down on the tree, and to the eastward, and somewhat screened by a large pillar-rose.

Doyenné du Comice is a splendid fruit; the best of all pears I consider, and that is why I have mixed so much of its generous blood with others, though I hope its season may be prolonged by being budded on to Glou Morceau.

The Swan's Egg crosses are legion; the poor parent seems to sulk now that her numerous daughters bear so marvellously. There was not one fruit on the old stock last year, though I had wonderfully good crops on some of the buds. A large crop of Louise Bonne of Jersey, a very fair crop of Doyenné du Comice, considering the size of the branches, and a really beautiful cluster of Souvenir du Congrès, quite a picture on a very small branch, some ten fruits on a branch about two feet long. Jargonelle gave good fruit; and a few splendid Gratioli of Jersey.

The bloom promise for this year is most astonishing. I have never seen anything like such a universal array of bloom spurs.

The show of Pitmaston Duchess on Doyenné du Comice is simply superb ; on the four branches I calculate there are at least 120, so that I hope when the fruit sets I may be able to steel my greedy heart so much as to reduce the fruit from two, three, and four on a spur, as was the case last year, to one, and then I may hope for much larger fruit. The promise on Swan's Egg is no less astonishing ; in fact, I think almost every cross is well represented as far as the gift of bloom is concerned, although the parent has, I think, on all its wide range of 36 ft. in width and 10 ft. in height not more than *two bloom spurs*, whereas on the various crosses there are hundreds of most promising bloom spurs. This is the case all over my garden, the walls are covered with what will be in April a simply magnificent display of pure beauty for an artist's eye to feast upon. It is the same with all my standards trained downwards ; they are marvels of beauty. One word more and I am done. My good and faithful servant, who has been with me for many years, now in his twenty-fifth year, loves all my surroundings as dearly as I do myself, takes as great a pride in all, and carries out everything that I wish, and guards all as only love and faithful service can and will do.

ARTIFICIAL MANURES AND THEIR BEARING UPON HORTICULTURAL PRACTICE.

By Mr. J. J. WILLIS.

[Read April 13, 1897.]

IN studying the history and progress of horticulture, we find that one of the very first requirements for a healthful condition and a subsequent successful propagation of any plant consists in adapting a well-devised system of soil preparation and of manuring.

I emphasise these points, not only on account of their intrinsic importance, but for the further reason that their management is in a controlling degree within the individual direction of every practical horticulturist.

There is but little doubt that an indifferent system of soil preparation and of the feeding of plants, is at the root of a great many well-founded complaints of failure in various branches of gardening, and in fruit cultivation in particular.

I have in my mind at the present moment an estate on which it was said good fruit could not be grown, and such luxuries as peaches, nectarines, and apricots, or, in fact, any stone fruit, was an utter impossibility; yet by the introduction of a gardener who was to some extent acquainted with the elementary principles connected with horticultural chemistry, and who understood the value and method of using artificial manures, this soil now produces some of the finest fruit in the kingdom, and that in abundance.

Our views as to the use of manures generally have undergone a considerable transformation during the past few years. Scientific investigation has succeeded in solving a number of most important questions, and we have in consequence been led to adopt new and clearer principles relative to the application of manure to our various cultivated plants. Yet, while the farmer has been told by the agricultural chemist how much phosphoric acid, how much potash, and how much nitrogen any of his crops require, also in what form they should be applied, and the way to use the manure to the best effect, so as to get the highest possible return; in most books on horticulture, and with the majority of practical gardeners, an astonishing ignorance is displayed on all these topics, and in actual work the condition of things is no different. Gardens, orchards, conservatories, and vegetable areas, are manured usually without any consideration at all. They are dressed with large quantities of stable-manure, farmyard manure, or vegetable compost, which frequently contains but little real plant-food sustaining constituents, no thought is given to the waste of certain ingredients, which must necessarily ensue from an excessive manuring with such materials, and how much more useful these manures could be rendered by an admixture with suitable artificial fertilisers.

It may surprise many gardeners to learn that 20 tons of good farmyard manure will not produce so large a crop of cucumbers as 150 lb. of nitrate of soda, provided available minerals are not deficient in the soil. The 20 tons of dung

will contain more than 200 lb. of nitrogen, while the 150 lb. of nitrate of soda will contain only about $23\frac{1}{2}$ lb. of nitrogen. And yet, that the great effect produced by the nitrate of soda is due to its nitrogen content there is abundant evidence.

Why, then, does not the 200 lb. of nitrogen in the farmyard manure do as much service as the $23\frac{1}{2}$ lb. of nitrogen in the nitrate of soda? Simply because the nitrogen in the dung is in the form of an organic compound, and has to be converted into nitrate of lime before the cucumbers or other plants to which it may be applied, can use it; while the nitrogen in the nitrate of soda is exceedingly soluble, and is available as plant-food at once.

Plants are set in pots of soil, yet few persons realise how they starve in such a small quantity of material, how they sicken and fall victims to fungi; how they suffer from decaying roots, simply because they lack nourishment of a suitable kind. Dr. Wagner, who may be quoted as an authority on this matter, says, "It is impossible to state how much more easily and conveniently, and how much more successfully, and with what greater financial advantage vegetable gardening, fruit culture, flower raising and growing, could be conducted if a rational system of plant-manuring were introduced." I myself am persuaded that a great future is in store for the horticulturist if he will but study the composition of artificial manures, and their adaptation to the needs of plants, so as to raise crops and place them on the market *out of season*.

A system of manuring may be called well devised or rational when it is based upon the results of a careful examination into the chemical composition of the plants under cultivation, and on a due consideration as to their natural capabilities for availing themselves of the needed food, both from the atmosphere and from the supplies within the soil.

The object sought in cultivating plants is usually to produce a growth in some of their parts that is unnatural to the species in its native habitat. This part may be the flower, the seed, the fruit, the stem, or the leaves. Or, again, the object may be to obtain an extra large amount of sugar as in grape production, or of starch as in the growth of potatoes, or it may be to produce leaves with more cellular substance and less fibrous matter

as in lettuce, spinach, or asparagus, &c.; all this means in the end nothing less than that the chance of the horticulturist for controlling the quality as well as the quantity of his crops is daily improving.

We are told by Dr. C. A. Goessmann, "That to feed plants intelligently implies possession in a fair degree of two kinds of information, namely a knowledge of the special wants of the plant under cultivation as regards the absolute amount and relative proportions of the various essential elements of plant-food; and also a familiarity with the composition and the general physical properties of the different kinds of manurial matter at our disposal."

All our cultivated plants, whether in the garden, the orchard, or in the conservatory, contain the same elementary constituents, yet no two of them are in the same absolute amount and relative proportions. Each plant has its especial wants at different stages of its development. Succulent and rapidly-growing vegetables require an abundant supply of nitrogen in an available form during their early periods of growth; flowers and fruit-trees require phosphatic food when blooming and developing seeds or fruit; grape-vines need a large amount of available potash during the formation and maturing of the grapes for the production of a rich and sugary juice; while potatoes require nitrogen and potash for the production of starch in the tubers.

The subject of my lecture being more directly in connection with the feeding of plants than with their chemical composition, I shall not trouble you with many analytical results. Nevertheless, in order to illustrate how plants of the garden may, and do, vary in their chemical constitution, I will direct your attention to a few statistics bearing upon the question.

Table I. gives the amount of selected constituents taken from the soil by the growth of one ton of various descriptions of vegetables. Column 1 shows the number of pounds of dry substance yielded; the second and third columns give the quantity of nitrogen and of ash in the fresh vegetables; while the fourth and fifth columns give the number of pounds of potash and phosphoric acid yielded by the ash of the plants analysed.

TABLE I.—SELECTED CONSTITUENTS in 1 TON of VARIOUS DESCRIPTIONS of VEGETABLES in a FRESH CONDITION. Quantities in pounds.

	Dry substance	Nitrogen	Ash	Potash	Phosphoric Acid
	lbs.	lbs.	lbs.	lbs.	lbs.
Green Cabbage :—					
Head	224	6	21	10	4
Stem	246	5	35	13	3
Potatos :—					
Tubers	515	8	21	13	4
Haulms	1,919	11	44	22	8
Carrots :—					
Roots	336	5	18	7	3
Leaves	399	11	54	6	2
Peas :—					
Seed and Pods . .	1,919	80	52	23	19
Vines	1,881	23	97	22	8
Onion Bulbs	314	6	17	5	3
Celery	356	5	39	17	5
Asparagus	150	7	11	3	2
Lettuce	134	5	18	8	2

Thus we see that in one ton, or 2,240 lbs. of green cabbage heads, there is only 224 lbs. of dry substance, 6 lbs. of nitrogen, and 21 lbs. of ash, the remaining 1,989 lbs. being water. The ash yields 10 lbs. of potash, and 4 lbs. of phosphoric acid. The stem of the cabbage is seen to contain in one ton weight 246 lbs. of dry substance, 5 lbs. of nitrogen, and 35 lbs. of ash. The ash contains 13 lbs. of potash, and 3 lbs. of phosphoric acid. Potatos carry off in each ton of tubers 515 lbs. of dry substance, 8 lbs. of nitrogen, 21 lbs. of ash, 13 lbs. of potash, and 4 lbs. of phosphoric acid; while one ton of potato haulms contains 1,919 lbs. of dry substance, 11 lbs. of nitrogen, 44 lbs. of ash, 22 lbs. of potash, and 8 lbs. of phosphoric acid. Peas are seen to carry off from the soil large quantities of each of the ingredients, while asparagus and lettuce are made up very considerably of water, and therefore contain in each one ton but a small proportion of nitrogen or of ash constituents.

The data show, however, that the refuse portion of vegetables, the stems and haulms, abstract from the soil a very much larger amount of plant-food constituents, weight for weight, than

do the marketable portions ; teaching us the advisability of returning to the soil all the unsaleable products.

There are quite a number of ingredients that enter into the composition of plant-ash—namely, potash, soda, magnesia, lime, phosphoric acid, sulphuric acid, oxide of iron, chlorine, &c. All, or nearly all, of these are proved to be necessary to the full development of horticultural plants ; but I have selected those which we find in actual practice necessary to return to the soil, and are willing to pay for in artificial manures. The other elements take care of themselves in nearly all fertile soils. Potash, phosphoric acid, and nitrogen are the three constituents generally taken into consideration, and the poorer the soil in what may be called its natural fertility, the more complete must be the restoration of these important ingredients that are carried away in the crops, if productiveness is to be maintained or increased.

In order that plants may obtain all the fertilising substances they require, it is necessary that there be a large excess of them in the soil, probably double the amount shown by an analysis of the crops grown. If a gardener proportions his supply of manure to the waste caused by the growth and removal of his crops, he will keep up the fertility of his soil to the degree in which he found it ; and if he gives more judiciously he will gradually increase its fertility, and enable it to withstand drought and other adverse influences more effectually.

The small amount of dry substance in the various vegetables enumerated in Table I. shows how largely these products are composed of water, and points to the fact that if the gardener is to ensure vigorous and uninterrupted growth in his vegetables he must have a sufficiency of moisture in the soil in immediate proximity to the mass of root-fibrils which branch out from the root-stock. In ordinary garden practice, farmyard or stable manure is not only largely relied upon, but it is often applied in exceedingly large quantities. It is probable that independently of the liberal supply of all necessary plant-food constituents in farmyard manure, its beneficial effects are in a considerable degree due to its influence on the mechanical condition of the soil, rendering it more porous, hence more moisture-sustaining, and, therefore, more easily permeable to the surface roots, upon the development of which the success of garden vegetables so

much depends. Then, again, something may be due to an increased temperature of the surface soil, engendered by the decomposition of so large an amount of organic matter within it; whilst the carbonic acid evolved in the decomposition will, with the aid of moisture, serve to render the mineral resources of the soil more soluble.

Good farmyard manure is very rich in available potash and phosphoric acid, which is doubtless one reason of its immense value and general application to all garden vegetables, containing as they do so large a proportion of these elements, frequently 50 per cent. of potash, and from 10 to 20 per cent. of phosphoric acid, in the total ash; artificial manures, therefore, are not recommended to take the place of farmyard or stable manure, but to be used in conjunction with them.

Table II. shows the percentage amounts of potash, lime, magnesia, and phosphoric acid in the ashes of four varieties of fruit trees and of raspberry canes.

These constituents are given in the ashes of the wood and in the ashes of the fruit separately. I might have quoted many other examples, but have selected these as showing how very variable is the composition of our fruit trees, and how greatly the composition of the ash of the wood differs from the ash of the fruit; and, further, for the purpose of showing that the manures to be applied to the soil for the nourishment of these trees, and to enable them to yield their fruit satisfactorily, must vary accordingly.

TABLE II.—SELECTED CONSTITUENTS in the ASHES of the WOOD, and in the ASHES of the FRUIT of VARIOUS TREES. Quantities per cent. :—

	Apple	Pear	Cherry	Chestnut	Raspberry
<i>Constituents in the Wood.</i>					
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Potash	19·2	4·2	20·8	10·1	14·2
Lime	63·6	77·2	28·7	43·6	38·2
Magnesia	7·5	5·1	9·2	3·2	10·8
Phosphoric acid	4·9	3·8	7·7	1·5	23·6
<i>Constituents in the Fruit.</i>					
Potash	46·2	54·7	51·9	39·4	50·0
Lime	4·9	8·0	7·5	7·8	19·4
Magnesia	6·5	5·2	5·5	7·8	9·6
Phosphoric acid	10·9	15·2	16·0	8·3	20·5

You will observe from this data that the demand made upon the soil by the growth of fruit tree wood is chiefly of the ingredient lime, and is very considerable, amounting in the pear tree to over 77 per cent. of the total minerals ; while the ash of the cherry tree contains but 28·7 per cent. of lime ; but on the other hand, the cherry tree is the largest consumer of potash. Again, while the wood of the chestnut requires but $1\frac{1}{2}$ per cent. of phosphoric acid, raspberry canes take up from the soil 23·6 per cent. of this element.

Let us now look at the fruit requirements as compared with that of the wood. One hundred pounds of ash of the various fruit contain from 39 lbs. to nearly 55 lbs. of potash ; the element phosphoric acid comes second in order, ranging from 8 per cent. in the chestnut to $20\frac{1}{2}$ per cent. in the raspberry. Cherries draw upon the soil, weight for weight, about like pears, being larger consumers of potash, phosphoric acid, and lime than are apples.

The two constituents, lime and magnesia, are very similar in quantity in the various fruits, but they are exceedingly wide apart in the ashes of the wood. Hence, in the growth of wood and for the formation of stones or pips in the fruit, lime and potash are the predominating ingredients required ; while in the production of the fleshy part of the fruit, and in fact whatever tends to maturation, it is potash and phosphoric acid upon which the greatest demands are made.

Table III. illustrates very strikingly the composition of the grape vine in its several sections, of stem, leaves, and fruit. The selected constituents of dry substance, ash, nitrogen, potash, phosphoric acid, and sugar are given in one ton of each, of fresh fruit, leaves, and stems.

The figures show that in one ton, or 2,240 lbs. of grapes, there are 363 lbs. of dry substance, 20 lbs. of mineral matter (ash) $3\frac{1}{2}$ lbs. of nitrogen, 10 lbs. of potash, 3 lbs. of phosphoric acid and 205 lbs. of sugar. In one ton of grape-vine leaves there are found 829 lbs. of dry substance, 93 lbs. of ash, 11 lbs. of nitrogen, 6 lbs. of potash, 1 lb. of phosphoric acid, and 40 lbs. of sugar. While one ton of the woody stems contains 981 lbs. of dry substance, 40 lbs. of ash, $4\frac{1}{2}$ lbs. of nitrogen, 4 lbs. of potash, $1\frac{1}{2}$ lb. of phosphoric acid, and 9 lbs. of sugar.

TABLE III.—THE GRAPE VINE. SELECTED CONSTITUENTS in 1 TON each of FRESH FRUIT, LEAVES, and STEMS. Quantities in pounds.

	In the Grapes	In the Leaves	In the Stems
	lbs.	lbs.	lbs.
Dry substance	363	829	981
Mineral matter (Ash)	20	93	40
Nitrogen	3½	11	4½
Potash	10	6	4
Phosphoric acid	3	1	1½
Sugar	205	40	9

The fruit of the grape vine is thus seen to be essentially a sugar producer; further, the data show that a certain proportion of this non-nitrogenous element is found in the stems and leaves also.

In practical work it is found that, provided the mineral constituents, and especially potash, are not deficient in the soil, the produce of grapes, and of sugar in the grapes, is greatly increased by the amount of nitrogen available to the vine within the soil, whether derived from previous accumulations, as from old turfy loam, or from direct nitrogenous manuring. I was told by a grape grower of extensive experience in Jersey that he found nothing so beneficial for grape culture as sulphate of ammonia, both for colour of skin and for sweetness of fruit.

The most prominent effect of the use of nitrogenous manures, combined with potash and phosphoric acid, is the increased production of sugar in the fruit and of dry substance and cellulose in the stems and leaves.

TABLE IV.—COMPOSITION of the STRAWBERRY. PLANTS and FRUIT. Pounds per acre.

	In Plants	In Fruit	Total
	lbs.	lbs.	lbs.
Dry substance	4,268	1,054	5,322
Nitrogen	89	16	105
Mineral matter (Ash)	414	49	463
Total	4,771	1,119	5,890

TABLE IV.—*continued.*

	In Plants	In Fruit	Total
Constituents in the Ash :	Per cent.	Per cent.	Per cent.
Potash	89.1	19.7	108.8
Soda	6.4	0.9	7.3
Lime	102.7	7.9	110.6
Magnesia	16.1	0.7	16.8
Phosphoric acid	35.3	5.4	40.7
Silica and iron oxide	43.3	5.3	48.6
Other elements	120.9	8.8	129.7
Total	413.8	48.7	462.5

Table IV. illustrates the composition of the strawberry plant and also of the strawberry fruit. The data show the amounts, which are given in pounds, of the various constituents that would be carried off from an acre of land by the growth of an average crop of strawberries. The last column of the table shows that more than two tons of organic matter, 105 lbs. of nitrogen, and nearly 500 lbs. of mineral ingredients are required per acre to sustain and build up the fabric of the strawberry plant and its proper proportion of fruit. Fortunately, by far the greater part of the dry substance of the strawberry plants is furnished from natural sources that are practically inexhaustible. Water, in the condition of rain and dew, and the carbonic acid gas, which abounds in never-failing quantity in the air, build the great bulk of the tissues of plants; therefore, for these constituents, except in times of drought or in culture under glass, we need have no anxiety. But moisture and carbon are useless without other constituents, which have to be derived from the soil. These are nitrogen and the mineral substances. Of all the elements found as entering into the composition of the strawberry as of other plants, we lay the greatest stress upon nitrogen, potash, and phosphoric acid, because, in addition to being necessary for the growth of even the smallest crops, they are not in sufficient quantity or in such an available condition that remunerative crops of strawberries can be obtained without a fairly continuous supply. We see from the figures given in Table IV. that the essential constituents of the strawberry plant and also of its fruit are nitrogen and potash.

Phosphoric acid stands third in order of requirement, the

ratio of potash to phosphoric acid being about 3 to 1. Lime is also an important element, but most fertile soils contain this substance in sufficient quantity for strawberry culture without any artificial application.

The strawberry is usually considered an exhausting crop, yet so far as the real loss of plant-food through gathering of the fruit is concerned, the facts, looking at them superficially, scarcely bear out this opinion.

To replace or restore to the soil the substances removed by the strawberry fruit would not in itself appear to require a very heavy application of manure. It is found, however, as a matter of practical experience that, to make strawberry culture successful, the soil must be fed very liberally. High manuring for strawberries is an essential condition for successful growth, because not only has the fruit to be provided for, but there is a great drain upon the plants in the production of runners. Then, again, the growing season is short, and more especially the fruiting period. During a comparatively brief time there is a large demand for immediately available forms of plant-food, a demand that must be met if the best results are to be obtained. And this need can well be supplied by artificial manures.

The essential elements of plant-food are not required by different crops or plants in the same invariable proportions at the various successive stages of growth, but are wanted at different periods of their life in different absolute amounts, and in different relative proportions; hence, it is of the utmost importance that artificial manures should be given in suitable and fixed proportions, and not at the mere fancy of the grower. Further, the particular form in which we apply the various articles of plant-food, as well as the special associations in which they may be applied, exert quite frequently a decided influence, not only on the quantity of the crop grown, but also on its quality.

ARTIFICIAL MANURES AND THEIR COMPOSITION.

I shall now direct your attention to the nature and composition of some of the principal varieties of artificial manures in the market, and afterwards make a few practical remarks on their selection and application to different horticultural productions.

Table V. gives the quantity of nitrogen, phosphoric acid, potash, and lime in average farmyard manure, in guano of "good" and of "bad" quality, and in twelve different descriptions of artificial manures, embracing those of a nitrogenous and of a non-nitrogenous character. The quantities of the various ingredients are given in pounds, in 1 ton weight of each kind of manure.

TABLE V.—Showing SELECTED CONSTITUENTS in 1 TON of FARMYARD MANURE, and in 1 TON of VARIOUS DESCRIPTIONS of ARTIFICIAL MANURES. Quantities in pounds.

Description of Manure	Nitrogen	Phosphoric acid	Potash	Lime
	lbs.	lbs.	lbs.	lbs.
Farmyard manure	11	8	12	16
Guano—Good, No. 1	357	213	182	198
„ „ No. 2	156	314	74	282
„ Adulterated, No. 1	4	201	2	1,535
„ „ No. 2	13	44	0	515
Bone manure	80	515	—	1,200
Superphosphate of lime	—	550	—	716
„ (double)	—	963	—	300
Basic slag	—	336	—	1,120
Kainit salt	—	—	515	—
Potash—Sulphate	—	—	1,120	—
„ Muriate	—	—	1,792	—
„ Phosphate	—	851	558	—
Ammonia—Sulphate	448	—	—	—
„ Phosphate	156	1,120	—	—
Nitrate of soda	336	—	—	—
„ potash	291	—	1,008	—

It is seen that 1 ton of average quality farmyard manure contains 11 lbs. of nitrogen, 8 lbs. of phosphoric acid, 12 lbs. of potash, and 16 lbs. of lime.

It has been found from numerous investigations that horticulturists use nearly 7 lbs. of nitrogen in the form of manure to get back 1 lb. of nitrogen in the crop produced. Therefore, so long as they use nitrogen in the form of farmyard or stable manure, it is absolutely necessary to use immense quantities of this material, owing to its low percentage of plant-food. Gardeners find it more or less profitable to use this bulky substance, but thanks to the investigations of scientific men, we now know how to obtain the same result with far greater certainty and at vastly less cost.

Guano.

The next manure on the list is guano; many horticulturists believe in guano who will use no other artificial manure; and the attraction of the name has kept this article, until recently, at a high price compared with other fertilisers of the same efficiency. Multitudes of inferior manures—many of them almost worthless—have been sold under the magic name of guano, of which I quote two instances that have recently come to hand.

Peruvian guano when pure is certainly one of the most important of the nitrogenous manures. Average samples contain from 5 to 8 per cent. of nitrogen, and from 20 to 35 per cent. of phosphate of lime. It is estimated that $1\frac{1}{2}$ ton of nitrogenous guano is equal to about 33 tons of average farmyard manure, the nitrogen of the guano being much more active than that contained in the dung.

In Table V. the "good" guano No. 1 contains in each one ton 357 lbs. of nitrogen, 213 lbs. of phosphoric acid, 182 lbs. of potash, and 198 lbs. of lime. As the greater part of the nitrogen in guano readily becomes soluble, it follows that if the deposit has been exposed for a long time to the weather, much of this constituent will have been washed away, and the residue will be chiefly insoluble, and consist to a considerable extent of phosphate of lime. Thus sample No. 2 gives an example of this kind, and is seen to contain in each ton, only 156 lbs. of nitrogen, less by 201 lbs. than sample 1; but 314 lbs. of phosphoric acid, being an increase in that constituent of 101 lbs. over sample No. 1. The potash shows a decrease of 108 lbs. in each ton, while the lime, the least valuable ingredient, shows an increase of 84 lbs. in each ton.

Now this very striking difference in the composition of guano not only applies to samples obtained from different sources, but even to those from different parts of the same cargo; therefore prudent buyers may naturally look to sellers for some guarantee as to the quality of their purchases, and should never purchase without it.

Specimens of glaring adulteration are shown by the two samples quoted. Thus No. 1, which had been adulterated with gypsum (sulphate of lime), contained in each one ton only 4 lbs.

of nitrogen, 201 lbs. of phosphoric acid, and 2 lbs. of potash, with 1,535 lbs. or $68\frac{1}{2}$ per cent. of lime. Sample No. 2 had been adulterated with sand, and contained in each ton 13 lbs. of nitrogen, 44 lbs. of phosphoric acid, no potash, and 515 lbs. of lime. About three-quarters of this sample, or 75 per cent., consisted of sand.

Good Peruvian guano has some advantage over most other unmixed manures containing the same percentages of nitrogen and phosphates, on account of its more complex chemical condition, the manurial constituents being in several different forms, of different degrees of solubility, so that they supply the plant requirements more slowly and evenly through the period of growth than can be done by manures in which the contents are each in some one form of chemical combination.

It has already been mentioned that guanos are found, varying in composition from the most highly nitrogenous, to those containing very small percentages of nitrogen, and that, generally speaking, those poor in nitrogen are rich in phosphoric acid. Hence we find that phosphatic guanos are usually obtained from old deposits which are located in rainy districts, and very largely from various islands in the Pacific. The materials left after a long exposure to the weather are chiefly mineral matters, containing phosphoric acid and magnesia, together with various impurities.

These guanos are frequently used for the manufacture of compound manures, and if properly made are rapidly acting fertilisers.

Phosphatic Manures.

The next four items in Table V. deal with phosphatic manures. Phosphate of lime is a substance which has acquired considerable importance in recent years, and is a fertiliser of great consequence. There are several varieties of this substance, as the term "phosphate of lime" includes such well-known manures as boned meal, bone ash, bone black, superphosphate of lime, phosphatic rock, basic slag, &c.

Bones may properly be included under the head of artificial manures, because they are allied to phosphatic guanos, and receive similar treatment in rendering their phosphate contents soluble, as in the preparation of superphosphate.

Bones are true phosphatic manures, although they contain a small percentage of nitrogen. The sample quoted in the diagram contains in each one ton, 80 lbs. of nitrogen, 515 lbs. of phosphoric acid, and 1,200 lbs. of lime.

Bone meal and steamed bone flour are usually in a very fine state of division, and the phosphoric acid, in the steamed material, is in a more soluble condition than in raw bone meal, consequently it readily decomposes in the soil, and is specially suitable when early vegetable growth is required.

Bones finely ground are much more effective than $\frac{1}{2}$ -inch or $\frac{1}{4}$ -inch bones, because the material can be more thoroughly distributed in the soil, and consequently comes into action with greater rapidity.

Care is required in buying bone manures, as they are sometimes adulterated either with chalk or gypsum.

Mineral superphosphate is the cheapest source of soluble phosphate; the ordinary quality is guaranteed to contain from 25 to 28 per cent. of phosphate made soluble. Superphosphate, however, is frequently made containing as much as 35 or even 40 per cent. of soluble phosphate. While by a special process what is called "double" or very concentrated superphosphates are manufactured containing 70 per cent. or more of phosphate made soluble. Double superphosphate is as good as free from sulphuric acid, and may contain three times as much phosphoric acid as ordinary superphosphate, so that the cost of transportation per ton of phosphoric acid is reduced to a third or even to one-half, whilst the unit of phosphoric acid does not cost more in double superphosphate than in the less valuable superphosphate.

Concentrated phosphatic manures are especially valuable for the purpose of ensuring a very rapid and vigorous early growth of plants.

We learn from investigations by Professor Wagner with vines, fruit trees, and berry-bearing shrubs, that a great deal depends upon these plants producing leaves rapidly and abundantly in the early spring, also upon the blossoms appearing at the right time, and upon the fructification ensuing vigorously; inasmuch as the more completely all these phenomena take place the more certain are the prospects of a fruit production satisfactory both for quantity and quality. In the case of kitchen vegetables and all seedlings, it is also of great advantage

to make these develop rapidly and vigorously in order that they may recover as soon as possible from the ravages made upon them by insects, frosts, and bad weather; further, that they may elaborate as quickly as possible a widely distributed and deeply penetrating network of healthy roots, and in this way acquire so much vital energy and so much power of resistance that they can encounter with successful opposition all injurious attacks, from whatever source.

In order to attain all this, the following condition must be fulfilled—that the plant during its early stages of development has placed at its disposal as much easily available and readily soluble phosphoric acid as it can possibly assimilate.

Basic Slag is a somewhat new phosphatic manure, containing from 14 to 20 per cent. of phosphoric acid, or equal from 30 to 42 per cent. of tricalcium phosphate. One ton weight will contain about 336 lbs. of phosphoric acid and 1,120 lbs. of lime; the latter will be of a caustic character, and will act on the nitrogen of the soil probably more quickly than the lime in superphosphate. The phosphoric acid in basic slag acts slower and over a longer period than the same element in superphosphate. It is a suitable material for providing the soil with a lasting supply of phosphoric acid, especially in the lower layers of soil, such as vine-borders; this manure will also ensure the healthy development of fruit trees, vines, ornamental trees, and shrubs. It also provides a good dressing for lawns, cricket grounds, and paddocks, as it encourages the growth of clovers and the finer quality of grasses.

Basic slag may be used in preference to superphosphate on all wet, peaty, and rich garden soils, on account of it containing free caustic lime which neutralises the organic acids of the soil. But it must not be used in combination with ammonia salts, because it sets the ammonia free and causes a loss of plant-food.

Potash Manures.—Four kinds of potash manures are enumerated in Table V.—kainit, sulphate of potash, muriate of potash, and phosphate of potash. Kainit is a crude potash salt, and the commonest form in which potash is now employed as manure. One ton will contain about 515 lbs. of potash, with about 25 per cent. of magnesia salts, and 35 per cent. of common salt (chloride of sodium).

Kainit is particularly suited for the growth of potatoes, as it both increases the weight of the produce and improves the quality of the tubers. It may also be used for vines and fruit trees, as indeed for most garden products, and also for lawns and paddocks. It may be mixed with superphosphate, nitrate of soda, or sulphate of ammonia.

Sulphate of Potash supplies in each ton weight about 1,120 lbs. of potash, therefore more than double that of the kainit ; it is especially helpful to all leguminous crops, such as peas, beans, scarlet runners, and similar plants. Vines, fruit trees, and roses will develop sturdily and bloom efficiently with an available supply of potash, combined with some phosphatic manure.

Muriate of Potash is now largely used as a manure ; it may contain 80 per cent. of potash, or 1,792 lbs. per ton ; therefore, per unit is frequently cheaper than sulphate of potash. It is a useful manure for fruit trees, but in some soils when applied to potatoes it tends to make them waxy rather than mealy.

Phosphate of Potash is a manure which embraces phosphoric acid and potash in one, yielding per ton 851 lbs. of phosphoric acid with 558 lbs. of potash. This will be found a substance ready for immediate assimilation, offering plants phosphoric acid and potash in an acceptable form, especially adapted to horticultural purposes.

The four last items on Table V. refer to nitrogenous manures.

Sulphate of Ammonia is a manure supplying nitrogen at the rate of 448 lbs. per ton. It is one of the most concentrated forms in which ammonia can be used, and is at the same time one of the most active and readily available forms.

From an economical point of view this manure cannot be recommended for chalky and limestone lands, as lime assists to expel the ammonia in the state of gas.

It has been found that sulphate of ammonia is a better manure than nitrate of soda, for applications with phosphates on clayey and strong soils. It is slower in its action than nitrate of soda, since its ammonia has to be converted into nitrates in the soil before it is available as food to the majority of plants.

The efficiency of a given amount of nitrogen in manure is greatly dependent on the completeness of the accompanying mineral supply, and especially on that of potash and phosphates.

Sulphate of ammonia mixes well with bone meal, wood ashes, and superphosphates.

Some extensive growers of grapes have reported that they get better coloured and better quality of fruit with sulphate of ammonia than with nitrate of soda, provided there is no lack of potash and phosphoric acid in the soil. It has also been found that the greater the excess of the nitrogenous supply, the greater the luxuriance of the wood and foliage and the less ripe and sugary will be the grapes. We may, therefore, say that sulphate of ammonia *by itself* tends to produce leaves rather than flowers or fruit, especially when the ground has been partially exhausted of its mineral matter by previous crops.

Phosphate of Ammonia supplies in each ton weight, 156 lbs. of nitrogen, and 1,120 lbs. of phosphoric acid. It is a very concentrated and expensive manure, yet adapted for flower raising, and for all valuable and delicate cultures in the open garden and in the conservatory, such as roses, chrysanthemums, fuchsias, camellias, flowering shrubs and foliage plants.

Nitrate of Soda is an exceedingly active nitrogenous manure supplying plant-food of the most concentrated and direct kind, and its action is both feeding and stimulating. The value of nitrate of soda depends on its amount of nitrogen, and Table V. shows that each ton contains 336 lbs. of that constituent. It supplies no potash, nor phosphoric acid; consequently for nitrate of soda to produce its proper effects, either the soil must be in good condition maintained by a plentiful use of dung, or a full artificial mineral supply must be supplemented.

As a rule, it has been found that the horticultural crops which require the most labour per acre, are the crops which yield the highest profits from the use of nitrate of soda, that is to say, the early crops of vegetables, or those produced "out of season." Thus 100 pounds of nitrate of soda will furnish more nitrogen to plants early in the spring than can be got from 8 or 10 tons of farmyard manure.

Farmyard manure will furnish nitric acid for late crops, but for early crops the market gardeners who fail to use nitrate of soda or similar concentrated fertilisers are not alive to their own interests. Nitrate of soda or sulphate of ammonia should be used in the garden, not as a substitute for farmyard manure, but as a highly prized and invaluable addition.

Nitrate of soda can be mixed with phosphatic and potash fertilisers as required.

Nitrate of Potash, the next item on the list, contributes both nitrogen and potash. One ton weight yields 291 lbs. of nitrogen, and 1,008 tons of potash. This will be found a useful manure for supplying plants in a combined form with the necessary quantity of readily assimilable potash, and of easily available nitrogen.

EXPERIMENTS WITH ARTIFICIAL MANURES.

I now direct your attention to some results obtained by experiment, after the application of various artificial manures, and of farmyard manure, to crops of potatoes, tomatos, strawberries, and peach trees.

Table VI. illustrates the effect of various manures on the growth of potatoes at Rothamsted, Hertfordshire. The results are a summary of produce obtained per acre over a period of twelve years, 1876–1887, without manure, with farmyard manure, and with various artificial manures, applied singly, and also in combination.

TABLE VI.—EXPERIMENTS ON POTATOS at ROTHAMSTED. SUMMARY of PRODUCE of TUBERS PER ACRE. Twelve years, 1876–1887. Quantities given in cwts.

Manures per acre	Total tubers	Gain over unmanured
	cwts.	cwts.
No manure	39 $\frac{3}{4}$	—
Superphosphate of lime, 3 $\frac{1}{2}$ cwts.	73 $\frac{3}{8}$	34 $\frac{5}{8}$
Mixed mineral manure	75 $\frac{1}{4}$	35 $\frac{1}{2}$
Ammonium salts alone, 400 lbs.	45 $\frac{3}{4}$	6
Nitrate of soda alone, 550 lbs.	52 $\frac{1}{2}$	12 $\frac{3}{4}$
Ammonium salts and minerals	134 $\frac{1}{2}$	94 $\frac{3}{4}$
Nitrate of soda and minerals	133	93 $\frac{1}{4}$
Farmyard manure, 14 tons	82 $\frac{3}{4}$	43

In the first place the data shows that the average produce of potatoes without manure is not quite two tons per acre. By superphosphate alone the produce is raised to nearly 3 $\frac{3}{4}$ tons, a gain of 34 $\frac{5}{8}$ cwts. per acre over the unmanured. By a mixed mineral manure, containing besides superphosphate of lime,

salts of potash, soda and magnesia, to just over $3\frac{3}{4}$ tons, that is to a little more than by the superphosphate alone, showing that up to this amount of produce the character of the soil exhaustion was much more that of available phosphoric acid than of potash. The beneficial effects of mineral manures, and especially of phosphates, are usually observed with ripened as well as with succulent crops that are spring sown in the garden, and which have, with a short period of growth, comparatively superficial rooting, and which rely, therefore, much on the stores of plant-food in the surface soil.

It is remarkable that there is much less increase of potato tubers by nitrogenous manures alone than by mineral manures alone.

Thus by ammonium salts alone there is an average produce of only 6 cwts. more than without manure; and with nitrate of soda alone there is an average increase of about double this amount, namely $12\frac{3}{4}$ cwts. per acre. The better result by nitrate of soda than by ammonium salts is doubtless due to the nitrogenous supply being more immediately available and more rapidly distributed within the soil, and so inducing a more extended development of feeding-roots. The next plot with the mixed mineral manure and ammonium salts together shows that there was an average of $134\frac{1}{2}$ cwts. per acre, a gain of $94\frac{3}{4}$ cwts. over the plot without manure; and with the mineral manure and the same amount of nitrogen as nitrate of soda, an average of 133 cwts. of tubers per acre was produced, that is nearly twice as much as with the mineral manure alone, and about $2\frac{1}{2}$ times more than with the nitrogenous manure alone. Finally, the bottom line gives the results obtained by farmyard manure, which, besides supplying to the soil an abundance of mineral matters, and a large amount of organic substance rich in carbon, yielding about 200 lbs. of nitrogen, yet gave considerably less produce of potatoes than an artificial mixture of mineral manure and ammonium salts or nitrate of soda, supplying only 86 lbs. of nitrogen per acre per annum.

The fact is, that it is only the comparatively small proportion of the nitrogen in farmyard or stable manure which is due to the liquid dejections of the animals, that is in a readily and rapidly available condition; whilst that due to more or less digested matter passing in the fæces is more slowly available, and that

in the litter remains a very long time inactive. Hence the addition of nitrogen as nitrate of soda, ammonia salts, or guano to farmyard manure has a very marked effect on garden produce generally, and especially that required for early production.

Table VII. gives the results of experiments on the growth of potatoes at Connecticut, United States, "On light soil" and "On heavy soil." The illustration is a summary of the total tubers obtained over four years, 1878-1881. The quantities are given in bushels per acre, without manure and with various artificial manures.

TABLE VII.—EXPERIMENTS ON POTATOS AT CONNECTICUT, UNITED STATES. SUMMARY OF THE PRODUCE OF MARKETABLE TUBERS per ACRE. Average of four years, 1878-1881. Quantities in bushels.

Manures per acre	Tubers per acre		Gain over unmanured	
	In light soil	In heavy soil	In light soil	In heavy soil
	bushels	bushels	bushels	bushels
No manure	65·7	97·9	—	—
Nitrate of soda, 200 lbs.	79·0	98·5	13·3	0·6
Superphosphate, 300 lbs.	91·1	132·1	25·4	34·2
Muriate of potash, 200 lbs.	96·5	118·7	30·8	20·8
Superphosphate, potash and nitrate of soda	138·9	193·3	73·2	95·4

The data thus given shows that in each case there were considerably more potatoes grown per acre on the "heavy" than on the "light" soil.

Thus, without manure, there was obtained on the "light" soil about $65\frac{3}{4}$ bushels of marketable potatoes per acre, while the "heavy" soil yielded nearly 98 bushels. Nitrate of soda alone raised the produce on the "light" soil about 13 bushels per acre, but less than 1 bushel per acre on the "heavy" soil. Superphosphate alone is seen to confirm very remarkably the results obtained at Rothamsted, by producing considerably more potatoes per acre than the nitrate of soda alone. Thus on the "light" soil there was a yield of 91 bushels per acre, and on the "heavy" soil a yield of 132 bushels per acre, a gain over the unmanured of 25·4 bushels, and 34·2 bushels per acre, respectively.

Muriate of potash alone, gave a better result on the "light" soil than did the superphosphate, but a worse result on the "heavy" soil, pointing to the fact that the "heavy" soil contained a sufficient supply of available potash, but that it was lacking in assimilable phosphoric acid.

A mixture of superphosphate, potash, and nitrate of soda, raised the crop of tubers on the "light" soil to nearly 139 bushels per acre, and on the "heavy" soil to more than 193 bushels per acre, a gain over the unmanured of 73 bushels on the "light" soil, and of 95 bushels on the "heavy" soil.

The incapacity of the potato crop to avail itself of the supplied nitrogen in manure, in the absence of a sufficient available supply of mineral constituents, is here very strikingly illustrated on each description of soil.

Table VIII. is an illustration of experiments on the growth of tomatos at New Jersey. The figures show the yield of fruit per acre, without manure, with various artificial manures, and with farmyard manure. The quantities are given in pounds.

TABLE VIII.—EXPERIMENTS ON TOMATOS AT NEW JERSEY. YIELD OF FRUIT PER ACRE. Quantities in pounds.

Manure per acre	Quantity of fruit	Gain over unmanured
	lbs.	lbs.
No manure	452	—
Nitrate of soda, 160 lbs.	646	194
Superphosphate and potash	600	148
Nitrate of soda, superphosphate and potash	728	276
Farmyard manure, 20 tons	698	246

The results show that without manure a yield of 452 lbs. of tomatos per acre was obtained; nitrate of soda alone produced 646 lbs. of fruit, a gain of 194 lbs. per acre over the unmanured. Superphosphate and potash applied together yielded less than did the nitrate of soda alone; but when these ingredients—the minerals and the nitrogenous manure—were supplied in combination, there was obtained 728 lbs. of tomatos per acre, a gain over the unmanured of 276 lbs.

Farmyard manure applied at the rate of 20 tons per acre,

supplying all the necessary constituents of plant-food much more abundantly than did the artificial manure, but in a less available form, produced only 52 lbs. more fruit per acre than did the nitrate of soda alone, thus showing that only a small proportion of the nitrogen of the farmyard manure was in a sufficiently assimilable form to be taken up by the tomatoes, in their short period of growth.

Table IX. shows experiments on peach trees at New Jersey. The variety selected was "Crawford's Late."

The results give the yield of peaches per acre of 130 trees, in each of the five years 1887 to 1891 inclusive, and the total yield of fruit for the five years. The quantities are given in number of baskets of fruit per acre. Nine plots are quoted: No. 1 without manure; Nos. 2 to 8 with various artificial manures, applied either alone or in combination; and No. 9 with farmyard manure.

TABLE IX.—EXPERIMENTS ON PEACH TREES at NEW JERSEY. Variety: "Crawford's Late." Yield of Fruit per acre of 130 trees. Each year and total of five years, 1887–1891. Quantities given in number of Baskets.

Plot No.	Manures per acre	1887	1888	1889	1890	1891	Total yield 5 years
		Baskets	Baskets	Baskets	Baskets	Baskets	Baskets
1	No manure	107	159	11	250	26	553
2	Nitrate of soda 150 lbs. .	82	150	32	247	26	537
3	Superphosphate of lime 350 lbs.	163	225	71	364	117	940
4	Muriate of potash 150 lbs.	124	230	118	497	143	1,112
5	Nitrate of soda and superphosphate . . .	141	345	99	468	182	1,235
6	Nitrate of soda and potash	114	295	167	455	52	1,083
7	Superphosphate and potash	174	322	150	432	169	1,247
8	Superphos: Potash and nitrate of soda . . .	152	419	153	592	156	1,472
9	Farmyard manure 20 tons	148	434	163	612	169	1,526

This experimental orchard was planted in April 1884, and I understand is still going on. The most recent report to hand says: "The trees on most of the plots are looking well for trees of their age, and that the differences between plot and plot are becoming

more marked every year. The trees on plot 1, which have received no manure since the commencement of the experiment, are making but feeble growth and show but little fruit. On plot 2, which receives nitrate of soda alone, the trees differ from plot 1 only in the colour of the leaves, which are darker. On plot 3, receiving superphosphate alone, the leaves are large and more uniform in size than on plots 1 and 2; there is a better production of fruit, but it is reported of small size. On plot 4, with muriate of potash, the leaves are not so large or uniform in size as those on plot 3; they are, however, of a darker colour, and the fruit is fully as good if not better in quality. Plot 5, receiving a mixture of nitrate of soda and superphosphate, shows leaves of good colour, uniformly large size, and increased production of fruit. Plot 6, with a manurial mixture of nitrate of soda and potash, the trees are reported to have a peculiar appearance, nearly all the small lower side branches have died, and the main branches are long and bare of foliage, except towards the top where they appear healthy and fruitful; consequently this plot gives a smaller production of peaches than plot 5 or than plot 7, which receives superphosphate and potash, but no nitrogenous manure. On plot 8, receiving a mixture of superphosphate, potash, and nitrate of soda, the trees are of uniform size, leaves healthy, and fruit of good quality. These are reported as the best row of trees in the orchard. On plot 9, receiving an application of twenty tons of farmyard manure per acre the trees are reported to have suffered somewhat from the over-bearing in the season of 1890, and it is thought a few will die."

Looking at the figures given in Table IX., the results show in a very remarkable manner the influence of climate on fruit production. The year 1889 produced in most cases the smallest quantity of peaches per acre, while the immediately succeeding year 1890, gave by far the largest quantity of fruit per acre, both without manure and under all conditions of manuring. It is seen that in 1889, the worst year of the five, the range of produce is from eleven baskets of fruit obtained without manure to 167 baskets obtained by the application of nitrate of soda and potash, being slightly in excess of the production by farmyard manure. In the best year of the five, namely 1890, the range of produce is from 247 baskets of peaches obtained by nitrate of

soda alone, being three baskets less than was grown without manure, to 612 baskets per acre obtained by farmyard manure. There was a considerable decline of fruit again in 1891, a result doubtless due in part to the exceedingly large production in the previous year, but also to climatal influences.

The total yield of peaches for the five years was, without manure, 553 baskets per acre; with nitrate of soda alone 537 baskets, that is sixteen baskets less than was obtained without manure, showing that the trees with nitrogenous manure alone produced wood and luxuriance of foliage rather than maturation and yield of fruit. Superphosphate alone gave 940 baskets per acre, a marked increase over the unmanured plot, or over No. 2 with nitrate of soda, without minerals; muriate of potash alone raised the yield of peaches to double that obtained either without manure or with nitrate of soda. Thus, mineral manures, supplying potash and phosphoric acid, tend very largely to the encouragement of fruit buds, and to the production of fruit—in other words, to maturation; while nitrogenous manures favour luxuriance of growth and plant-cell formation.

A combination of nitrate of soda and superphosphate produced in the five years 1,235 baskets of peaches, a similar quantity being grown on plot 7 with superphosphate and potash without nitrogen. But when a mixture of superphosphate, potash, and nitrate of soda was given, a total produce of 1,472 baskets of fruit was harvested. The highest total yield was however obtained on the farmyard manure plot, viz., 1,526 baskets of fruit, although in three years out of the five one or other of the artificially manured plots exceeded the farmyard manure plot in yield.

In conclusion, a careful consideration of the different points I have endeavoured thus briefly to place before you, cannot fail to impress the fact that to manure horticultural soils and crops efficiently, means to-day something more than to incorporate into the earth an exceptionally liberal amount of such a varying substance as farmyard or stable manure, vegetable composts, and the like, which may take many years to yield all the effects of which they may be capable. Further, an excessive accumulation of organic matter in the soil is apt to turn it into a breeding place for injurious insects, or of parasitic productions. A moderate use of what are termed “natural manures,” supplemented

by a suitable addition of concentrated commercial fertilisers, for the purpose of rendering the former more rapidly available in order to force particular garden products "out of season," should commend itself to the horticulturist on account of the directness with which he can thus reach the object in view. Both good economy and the preference for a healthy and vigorous condition of our cultivated plants advise a change from an indifferent system of manuring to one of a more rational character.

Curiously enough the ready availability of the best and most concentrated artificial fertilisers is sometimes used as an argument against their use, as compared with slower or more lasting manures. If a manure lasts, it simply means that the return for its cost is delayed, the capital it represents yielding no interest until it is realised. I would emphasise the fact that a well-chosen artificial manure should act promptly and decisively upon the crop, or upon the particular plant to which it may be applied.

It is hoped that the facts now laid before you will assign to artificial manures their proper place in the garden, the conservatory, and the orchard, and will direct the attention of the horticulturist and the orchardist to the great value of these concentrated fertilisers, which have hitherto been overlooked or but insufficiently appreciated.

DISCUSSION.

Mr. A. D. HALL, Principal of the South Eastern Agricultural College, suggested that the lecturer, and still more so, many of the gardening papers, laid far too much stress on the composition of particular plants as a guide to their manurial treatment. It was Liebig's initial theory that it was only necessary to put into the soil the ash constituents (and nitrogen) taken out by each crop, but experimental evidence and practical experience had shown not only that this view was incorrect, but that in many cases the very constituent that was least in amount in the plant's composition was the one upon which its growth mainly depended under ordinary conditions of cropping. To give some examples from the Rothamsted figures; swedes are usually grown with superphosphate or other phosphatic manure alone, yet a crop of swedes removes only 22 lbs. of phosphoric

acid per acre from the soil as against 98 lbs. of nitrogen and 80 lbs. of potash; a clover crop is practically independent of nitrogen manuring, despite the 102 lbs. it contains per acre. Ordinary arable soil, and still more so garden soil, contains at least one hundred times as much plant food as the plant can remove, though only part is in a condition immediately available; there is generally one particular constituent the plant finds a difficulty in obtaining, and which must be supplied in excess as manure. Given this excess in one direction, the plant can feed itself in other respects, but the particular constituent each crop needs can only be decided by actual experiment, which in the case of garden crops has rarely been carried out.

But the special point which the speaker wished to bring before the attention of gardeners was the advisability of using pure unmixed artificial manures, instead of the compounded articles to which they generally trusted. There were three disadvantages in using these readymixed manures; they did not know what they were using, and so had no means of reasoning back from the results they obtained, and thus accumulating experience for future use; they paid absurd prices for even the good mixtures; and they had no protection from absolute fraud.

Many of the fertilisers commonly employed by gardeners had been sent to the speaker for analysis, and latterly he had made a point of collecting and examining all he saw advertised in the gardening papers; as a general rule they contained organic nitrogen and sulphate of ammonia, sometimes also nitrogen in nitrate of soda, horn dust, &c. The phosphatic part of the manure was generally bone meal, often dissolved bone or superphosphate was also added; potash was present as kainit, but often omitted; while fish-meal or ground cake residues were sometimes employed as a general organic basis for the manure.

The following table gives the result of these analyses. The samples examined were either portions of large consignments or were the contents of the shilling tins that are commonly sold, and as it is practically impossible for the maker to deliver each small parcel of uniform composition, the names of the makers are not published.

The valuation attached to each manure is arrived at by a method which should be understood by every gardener, as it is only by this means that the price demanded for any manure

	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	Steamed bone flour	Fish guano	Chin- chas guano
Moisture	8.38	14.2	12.62	4.87	13.75	—	13.77	15.04	9.37	3.79	9.6	8.42	16.9	9.65	—
Organic Matter, &c.	37.4	28.9	71.72	36.54	37.3	—	32.62	55.87	33.92	14.53	43.2	—	11.8	60.35	—
Nitrogen (total))	4.7	3.8	6.53	7.15	6.5	9.05	1.76	4.21	3.18	7.25	5.6	6.4	1.4	7.4	16.1
" as Nitrate	0.28	0.24	—	1.35	0.4	5.05	—	1.	—	—	0.21	4.3	—	—	0.32
" as Ammonia	1.92	1.1	—	4.7	5.7	4.	0.39	.63	—	6.2	1.	2.1	—	—	3.94
Phosphoric Acid (soluble)	—	5.9	—	0.4	3.8	11.7	—	0.4	—	5.67	7.73	4.12	—	—	2.64
" (insoluble)	7.5	5.25	2.38	18.6	3.9	8.3	1.56	4.35	11.22	1.4	2.93	1.42	28.7	8.17	6.7
Potash	—	6.05	2.18	—	1.24	29.5	—	2.78	—	3.7	3.29	20.3	—	—	2.2
Sand, &c.	2.73	4.47	2.06	1.5	3.53	.36	36.12	2.95	1.03	2.78	4.85	2.	—	4.2	—
Valuation per ton	68s.	101s.	81s.	125s.	96s.	279s.	22s.	67s.	72s.	114s.	109s.	166s.	93s.	97s.	199s.
Advertised price	{ £20 per ton	£18 per ton	£20 per ton	£20 per ton	£32 per ton	£22 per ton	70s. per ton	£18 per ton	£14 per ton	£25 per ton	—	—	75s. per ton	85s. per ton	£13 per ton

can be fairly estimated. The method consists in summing up in a mixed manure the value of each constituent—nitrogen, phosphoric acid, and potash—from the value of these substances as they can be bought in an unmixed condition. For example, nitrate of soda contains about 16 per cent. of nitrogen, and can be bought at £8 per ton; it follows, therefore, that in nitrate of soda $\frac{1}{100}$ of a ton (or 1 per cent.) of nitrogen, costs 10s., since there is nothing else of value in the nitrate of soda.

Again, basic slag, containing 17 per cent. of phosphoric acid, can be bought for £2. 5s. per ton, so that we can allow 45s. divided by 17 = 2s. 9d., for the value of $\frac{1}{100}$ of a ton of phosphoric acid; if the phosphoric acid is in a soluble condition it will be worth 4s. for the $\frac{1}{100}$ of a ton, since superphosphate containing 12 per cent. of soluble phosphoric acid costs about £2. 10s.; lastly we can estimate $\frac{1}{100}$ ton of potash to be worth about 4s., since kainit, with 11 to 12 per cent. of potash, costs about £2. 5s.

Taking these values and the analysis of the first manure on our list (which is one of those most widely used by gardeners), we see that it contains 4.7 per cent. of nitrogen; in one ton of the manure there is therefore 4.7 hundredths of a ton of nitrogen worth $4.7 \times 10s. = £2. 7s.$; the insoluble phosphoric acid amounts to 7.5 hundredths, worth $7.5 \times 2s. 9d. = £1. 0s. 7\frac{1}{2}d.$, and as there is no potash or soluble phosphoric acid present the total value of one ton of the manure is £3. 7s. $7\frac{1}{2}d.$, instead of the £20 or so for which it is sold.

The last three manures are unmixed manures that can be obtained at the present time from any merchant for about the prices mentioned for lots of one ton or more; of course for smaller quantities a somewhat higher price must be paid, but not to the inordinate extent demanded in the mixtures commonly sold. As in two cases the valuation is greater than the price, it is evident that the price taken for nitrogen, phosphoric acid, and potash in all the valuations is not unfair. In the table one manure stands out as an honourable exception (No. 6), which, on account of the almost complete solubility of all its constituents and its high degree of purity and concentration, is well worth the money asked for it.

In the table no mention is made of a further class of so-called silicate and slag manures, which contain no appreciable

amount of either nitrogen, phosphoric acid, or potash, and are consequently devoid of fertilising properties; these substances, despite their specious advertisements and numerous testimonials, should be let severely alone. Road-scrappings are much more valuable material.

Speaking generally, the gardener is chiefly short of phosphoric acid; the dung he uses is proportionally richer in nitrogen and potash than in phosphoric acid, so that if he supplements his dung by dressings of steamed bone flour or basic slag in the winter, he will keep his soil in excellent condition. A little nitrate of soda is further very useful when forcing an early crop or raising a heavy crop rapidly, since in these cases it is not always possible for the nitrogen of the soil to change into an assimilable condition rapidly enough for the needs of the plant.

Where one of these compound manures is wanted a mixture of four parts of steamed bone flour, two parts rape dust or fish meal, two parts kainit, one part superphosphate, and one part sulphate of ammonia will make an excellent cheap all-round fertiliser, costing about £4 a ton, and worth more than most of those usually sold. But it should not be forgotten that this, like most concentrated manures, should not come into direct contact with the delicate roots of plants, but should be mixed with the potting soil some time before it is used.

WINTER AND SPRING BEDDING IN FLOWER GARDENS.

By Mr. A. DEAN, F.R.H.S.

[Read April 27, 1897.]

WHETHER the practice of bedding out diverse plants in flower gardens annually, or more often, be right or wrong, at least it has behind it some half-century of existence, and so long as the practice remains all effort should be directed to making the best of it. That strong opinions antagonistic to the practice have been put forward influentially there can be no doubt, but if it be objectionable, at least it dies hard; and if it be otherwise, then

will it endure for yet a long period. We owe the bedding system chiefly to the introduction into flower gardens from time to time of large numbers of diverse and beautiful plants, chiefly tender, that do not make individually any great display, or give marked effects ; but which, grouped in masses, have and do give exceeding brilliancy of coloration, and in that way constitute great attraction for those who appreciate such effects. That, to a large extent, summer bedding has lent itself in the past to the production of garish, and sometimes almost vulgar effects and combinations, there can be no doubt. Happily, there has been material improvement during the past ten years, and now the tendency seems to be, whilst employing material in exceeding variety, yet so far to tone coloration as to produce effects that are distinctly pleasing and refined. No doubt such improvements have done much to help the bedding practice to a longer life than well could have been the case had the old garish combinations continued. But where flower beds are annually filled with tender or semi-tender plants, specially to produce particular summer results, it is obvious that such material could not remain in the beds during the winter months without being either destroyed by frost, or rendered so objectionable as to be the reverse of decorative. That has indeed been the experience of the system from its first inception ; and where existing, the rule has yearly prevailed of planting the beds in spring, clearing off the demoralised contents in the autumn, and then, as was at one time the case, leaving the beds bare all the winter, or filling them with some hardy material suited to produce flowers in the spring, which, in turn, had to be cleared off to make room once more for the summer bedders. Probably the prevailing bareness of the beds during winter presented the severest element in any indictment of the system of summer bedding, because a series of bald bare beds on turf or gravel for one half the year was more offensive than even none at all, and almost more so than were some of the gaudy effects obtained from them in the summer, whilst what may be described as winter bedding never has been widely practised, and is indeed comparatively young. The practice of filling the otherwise bald beds in the late autumn with various hardy spring-flowering plants is almost relatively old, and had for its pioneer Mr. J. Fleming, who at Cliveden did so much in the huge beds on the lawn there, through the agency of such simple

plants as Early Pansies, in colours blue, purple, and white ; Forget-me-not, *Silene pendula*, *Limnanthes Douglasii*, Double Daisies, and similar easily-raised plants, to secure on the surface of the beds during winter some little greenery, and in the late spring very striking masses of colour. But in those days we had not the hardy material at hand for the production of spring bloom that is now so plentiful ; and the Cliveden system, such as it was, suffered from the fact, first, that the plants used were for several months flat, and utterly ineffectual in affording garden relief ; whilst most of them flowered so late that the spring had almost become summer ere the floral beauty of the plants was seen. Obviously in any method of bedding intended to make a flower garden pleasing during the winter as well as spring, other and very diverse material from that employed at Cliveden has to be introduced, not only for the purpose of rendering beds, if not gay in winter, at least interesting and pleasing, whilst it was imperative that the blooming material should give its floescence so early as March and April rather than in May or June.

It is interesting to turn for a moment to a very diverse form of bedding, which was practised with such marked success by the late William Wildsmith during what may be termed the palmy days of Heckfield Place. There Mr. Wildsmith had a summer garden of exceeding beauty, so far as it was possible for so artificial a method of gardening as the bedding-out system offers of true garden beauty. He laboured whilst securing floral effects always to furnish pleasing relief, and it was generally admitted that of its kind few summer bedded-out gardens were more beautiful or tasteful. Having to meet the requirements of a family that were in their movements influenced by parliamentary assemblages, it was needful to keep the flower-beds as well filled in winter as in summer, and employing for carpets especially certain hardy plants. These carpet edgings were retained in the winter, and the places of the tender plants were taken by small conifers, evergreen shrubs, hardy heaths, and many things of similar character, including even dark-leaved beet, and thus real winter-bedding was produced that was for the season of the year invariably attractive. For the benefit of this form of bedding a small nursery was maintained, some few things being purchased yearly. But when the family left Heckfield for London in February, the beds were dismantled and became bare

until the usual summer bedding again began. Thus, in the two somewhat famous cases quoted, neither was really of the form which it is desired to create. Since those days, in not a few good gardens there has been seen considerable development. Conifers, green and variegated shrubs in large variety, early spring-blooming plants in exceeding abundance, and bulbs, cheap and good, also in abundance, have been used in combination with admirable results; and if putting upon the garden staff some additional labour, as well as of expense, on the maintenance account, yet have both extra labour and cost been amply repaid, and some most beautiful effects produced. It is this description of bedding which so truly merits the appellation of winter and spring garden decoration.

I am not oblivious of the fact that some few years since the able secretary of the Royal Horticultural Society read in this hall a paper entitled "A Method of Winter Gardening," and whilst based very much on the same lines as my own paper, yet he specially advised the growing of conifers and shrubs in pots for the purpose, plunging them where needed in the beds during the winter. To his methods I take no exception. What anyone has found to be in his case good practice, he should boldly advocate, and the Rev. Mr. Wilks does not lack courage. I can have no doubt but that the vicarage garden at Shirley is both in winter and spring fully as beautiful and as interesting as that paper, January 14, 1890, indicated. But I take grave exception to his lugubrious description of annually transplanted evergreen shrubs which, he said, moved twice a year, soon put on a thin draggle-tailed appearance, resembling broken-down beggars, &c. Well, were that mine or general experience, I should not advocate the use of these shrubs as I now do. I have not seen these appalling results following from half-yearly transplantings, neither do I think such is the usual experience of nurserymen. That a few yearly may become too large, or perhaps thin of foliage, is possible; but so cheap are these things that a few dozens purchased yearly, costs little, and always serves to keep a good stock of useful stuff in hand. The nursery set apart for this particular department of garden work should be on a north aspect, and the soil deeply worked and well pulverised. Conifers and shrubs, frequently lifted and planted, create clusters of fibrous roots, which soon attach themselves to the soil, yet do not create

luxuriant growth, as the chief object in view is to have small, compact plants of good foliage and colour. Of course, after the spring replanting into the nursery, an ample supply of water is needful in dry weather, and special provision should always be made for that purpose. Now as I have appended at the end of this paper a list of conifers, shrubs, &c., specially suited for winter bedding and frequent transplanting, I do not propose to introduce names largely. I may say, however, that in compiling the list, I am greatly indebted to Mr. Howard, Messrs. Veitch & Sons' able foreman at Coombewood, for efficient revision of the contents. It will be seen that the range of selection of conifers only is very great. Whilst size is a matter for the planter to determine, nature has furnished in golden, silver, green in shades, and even almost red or coppery hues, ample variety in colour. Many of these conifers seem to show their special hues all the more fully when somewhat restricted in growth, and they, effectively employed, or blended, are most pleasing during the dullest weather. Of shrubs such as Aucubas, Boxes, Hollies, Euonymuses, Mahonias, Ivies, Elæagnus, &c., there is great variety, having diversely coloured leafage; and of really compact growing, effective, green-leaved varieties, there are great numbers. Then there are some that berry freely, and in that sense alone are most effective. Skimmias, frequently transplanted, are at Glen Eyre, Southampton, literally loaded with red berries all the winter, the birds doing no harm. In the same way the compact habited Aucubas will berry marvellously, and wear a very bright aspect all the winter. Then Pernettyas also, if grown specially in peaty soil, berry abundantly, and thus become very effective. But we need not be limited entirely to evergreen shrubs, for most beautiful for early spring blooming are the Forsythias, flowering currants, scarlet Pyruses, the yellow-tufted Mahonias, and the pretty Daphne Mezereon. All these, carefully treated, may be employed to decorate beds in the spring.

Very valuable too are the Vincas, whether green or silvery. These with some ivies, planted to form carpets or rings, may be used to cover or enclose clumps of hyacinths or other bulbs, whilst there are several hardy heaths that bloom early, and form very charming features. In planting conifers and shrubs in beds, if the plants be small, I should prefer grouping them into

small clumps, rather than merely sticking in one here and there, to give some relief, as is so commonly seen.

Practically the gardener in planting should aim to produce an illusion to the effect that the beds thus temporarily planted are really so permanently, intermingling between the evergreens such plants, bulbs, or otherwise, as he may have at disposal, and of which there is now such a wealth to choose from. Any attempt to obtain large bold masses of colour, whether from bulbs or hardy spring flowers, should not be tolerated. Those who plant as may be seen in London parks and gardens huge flat monotonous beds of bulbs, and those who profess to admire them, have about as much taste as have those pictorial connoisseurs, who find more of art and beauty on a street hoarding than within the National Gallery. Not one whit better are the masses of *Silene*, *Arabis*, *Myosotis*, *Violas*, &c., often seen in gardens in the spring, and all of which should be banished from garden beddings. It may naturally be asked why take so much of trouble in annually planting and replanting flower beds? Why not let them be of a permanent character? Those who prefer to do so may of course have them permanent, merely adding a few fresh plants from time to time, to afford in that way a little variety. But permanent beds means considerable sameness from year to year, as well as all the year round, whilst every gardener knows that if real justice is to be done to the plants utilised, whether they be shrubby or herbaceous or tender, the soil must occasionally be deeply worked and manured, for it is only in that way that striking effects, whether mixed or otherwise, can be obtained. Then, whilst even in permanent beds flowering plants of ordinary kinds may be planted and removed, as occasion or season may necessitate, conifers and shrubs soon become too large, and require all the space hitherto allotted to the flowers, so that the latter become of trifling importance, whereas the beds were originally chiefly designed to enable them to exhibit their decorative qualities. The frequent transplanting of the bedding material may entail considerable labour, but what is there in gardening worth having, that does not entail labour to produce? Still further the value of such labour is less to be judged by its cost, or time occupied, than by the results obtained. Now there can be no objection to the planting of beds on the mixed plan every autumn, thus saving the spring labour. The advantage

resulting is that the autumn is the best time for the planting of all hardy things, that work is just then less exacting than it is in the spring, and that there is in the renewed planting, largely perhaps with fresh material, certainly with varied material, in the autumn, very desirable charm, because the winter is always a dull garden season, and any new or distinctive effects which can then be produced furnish a charm for garden enjoyment, even more acceptable than is the case in the early summer, when nature has done so much to add charm to gardening. The planting of the beds with conifers and shrubs varied in form and in coloration, amongst which are interspersed bulbs in great variety in clumps, also hardy perennial foliage and flowering plants, that give their effects during the winter and spring months, admits of material variation in the late spring when much of this latter may be removed and be replaced with such tender plants as the taste of the gardener may prefer, or the particular positions in the beds may render suitable. Certainly in this case, whilst having the beds filled with plants of some description all the year round, it would not be practicable to produce in them those glaring or flat and formal masses of colour at any time, such as large groups of scarlet pelargoniums, yellow calceolarias, gazanias, or marigolds, blue lobelias or even duller petunias, or heliotrope give in the summer, or wallflowers, forget-me-nots, silene, and similar plants, or hyacinths, tulips, and narcissi are made to do in the spring.

But it must not be assumed because these respective plants and myriads of others may not be thus employed *en masse* in garden decoration, that they may not be judiciously and even liberally utilised in winter or summer bedding. When some half-century since, or in relation to an event of exceeding interest, which is celebrated this year, shall I suggest sixty years ago, "mixed beds" in flower gardens were common; they contained even at the best but a very poor floral representation, as compared with what can be furnished to-day, not only in hardy but in tender material. Hence such beds were not often very attractive, and equally often not tidy. No doubt the bedding system as it is called largely grew out of a revulsion against such poor unattractive displays, and led to the extreme of huge masses of glaring colours and unhappy combinations which in time resulted. No such reason for revulsion now exists against mixed bedding, for

it is so easy to have such beds singularly varied and gay, because of the material at the disposal of the gardener. Take, for instance, hardy foliage plants. Who that has a stock of that much neglected but singularly effective thing, the Golden Valerian, but has found its clumps of foliage to be of striking beauty in the early spring months. A few of these dotted here and there in beds furnish most welcome colour; very effective also are the variegated conifers for this purpose. Then the well-known ribbon grass, found plentiful enough in some old gardens in huge clumps, is easily divided with a spade, and such clumps, if medium size, planted in the autumn are most effective in giving colour in the spring. Even the well-known variegated cress, so easily raised from seed sown in the summer outdoors, will, if planted in small clumps, give very effective patches of gold for a long season. Most effective as a clump carpet is the too little known golden-tipped *Sedum* which assumes so charming an aspect in the early spring; and *Sedum glaucum* is also of a useful nature. There are two excellent members of the *Arabis* family, *albida variegata*, silvery, and *mollis variegata*, golden, each hardy and pleasing, and if dark colours be needed, it is easy to have strong plants of the claret-leaved Sweet William, from a summer sowing of seed, or of the metallic-leaved *Ajuga*, which is so hardy. These are but a few of this section of very hardy material useful for winter and spring bedding. As to flowering plants, all hardy and blooming early, they are legion. Earliest of all is the white *Arabis*, so often and unpleasantly seen in great abundance in gardens, but which should be found only in moderate clumps. How soon is this succeeded by the pretty light blue *Myosotis dissitiflora* which flowers so profusely from plants raised from seed sown in August. Clumps of this Forget-me-not are so pleasing in the early spring. The several *Aubrietias* also, how hardy they are, and established clumps lift and transplant admirably in the autumn. A good cluster of *Viola* or *Olympica*, or of the reddish-flowered *Leichtlini*, some 12 inches across when in bloom, is rendered most attractive when surrounded by a natural edging of silvery *Vinca*, or indeed of any whitish-leaved plant. These *Aubrietias* may be propagated readily through the agency of young tips as cuttings in the early summer, or by dividing the plants after they have bloomed, or by saving seed and sowing as soon as ripe, the majority of the plants coming

true. Primroses, of which there are so many diverse colours, come easily from a sowing made early in the spring, the plants being dibbled out during the summer into a nursery-ground, from whence they can be transplanted into the beds in the autumn. Border polyanthuses, to follow in bloom a week or two later, may be sown at the same time and be similarly treated. Both these members of the great *Primula* family render immense service in the spring garden; indeed, strong plants often bloom freely through the winter. These strains are all large-flowered, of many colours, mostly rich and striking, and should be found abundantly in every garden, for they deservedly rank amongst the earliest and most beautiful of spring flowers. Where selected plants of those that give bold heads of colour, white, yellow, red, crimson, or purple are divided, and thus increased so as to enable clumps of three or five plants to be put out, or where from a batch of seedlings of a year's growth plants giving analogous colours be selected and planted up into clumps the following autumn in the beds, they give beautiful and long-enduring effects. This is a section of hardy spring flowers far too little used for such purposes. A stock should be raised from seed every year. A beautiful yellow-flowered plant, cheaply obtained, is the dwarf *Alyssum saxatile*, which can be got in quantity from seed easily. So also too can be had dwarf Belvoir yellow and tall yellow wallflowers, seed being sown at the end of May, and the plants when large enough dibbled out 12 inches apart into rather poor soil, to render them compact and sturdy for transplanting in October. Striking yellows also, and early, are the *Doronicums*, especially *Austriacum* and Harpur Crewe. Clumps of these transplant readily, and in bloom are singularly effective. Yellow is also obtainable from old plants of early pansies and violas. Of the former, selected seedlings of a yellow strain often give the best results; and of the latter, Bullion, Ardwell Gem, Yellow Boy, *Lutea grandiflora*, and the soft-hued Lemon Queen, are early and valuable. Of all pansies no doubt the best early blue is the well-known Blue King. This capital variety has not yet been excelled for early work; other good blues being Holyrood, Archie Grant, The Tory; and of the smaller-flowered violas Blue Cloud, True Blue, Blue Bell are fairly early, and, like the pansies, easily propagated by division or from cuttings. Those who prefer better or parti-coloured flowers can find an

abundance of them in both pansies and violas. The best white of the latter section are, doubtless, Countess of Hopetoun and Snowflake; but the best early white pansy I have seen is Messrs. Sutton & Sons' seedling strain of Giant White, which gives from established plants very early in the spring big clumps of pure white flowers. The finest of the strain propagated by cuttings soon furnish wonderfully effective bedding material. If purples or yellows be desired they can be secured in quantity in the same cheap way. As to violas, those who have seen the stock plants left out in beds all the winter in Messrs. Cannell & Sons' grounds at Eynsford, when in bloom in April, can better estimate the exceeding value of these hardy plants for spring beddings, than where no such experience has been obtained.

It is not possible in any reference to spring gardening to overlook the merits of the Giant White double daisy and of its rich coloured compeer, King of Crimsons. These two are undoubtedly the best, and, planted up thickly in clumps of several plants, are very pleasing. But how many of these hardy early blooming plants there are that may be utilised. The perennial candy-tufts, of which there are several, especially *correaefolia* and *Garrexiana*; the beautiful golden and orange globe flowers, *Trollius*; the too seldom seen double white tuberous saxifrage, the rich scarlet-flowered *Anemone fulgens*, the charming blue forms *appennina* and *blanda*, the double white form of *nemorosa*, so effective in clumps; or, not least, early planted clumps of the Irish poppy *Anemone* and its beautiful varieties which bloom so finely and so profusely in the spring.

But even in referring to this somewhat long, yet very imperfect, list of hardy spring flowering plants I have hardly mentioned bulbs, yet in no case can these be left out of any effort to make flower-beds gay in the spring. Objectionable as to me are large flat masses of any bulbs, however striking in coloration, it is not possible to over-estimate the charm which moderate clumps of crocuses in colours, of snowdrops, scillas, *chinodoxas*, grape hyacinths, tulips, narcissi, and hyacinths lend to beds when judiciously planted. To attempt the production of big colour masses is not only to defeat the object in view, that of creating pleasing and refined effects, but also exposes at once all the trumps in the planter's hand. That is the too common fault of all bedding, whether of spring or summer, for

one glance round a flower-garden reveals everything. What is so much more desirable is the combining shrubs and creepers with bulbs and hardy flowering or foliage plants, so that the flowers may be found rather in nooks and slight seclusions than in exposed masses, new objects thus indirectly meeting the eye at every turn. Still farther, if something be getting out of bloom others are succeeding. I am not sure whether, conducted on the lines set out in this paper, winter and spring flower gardening, but the spring bedding especially, may not be found more attractive than any display of summer bedding, especially when seen under the glare of hot sunshine, ever can be. In any case, it is garden decoration of the cheapest, and may be more or less practised in everybody's garden.

LIST OF THE MOST SUITABLE CONIFERS AND SHRUBS FOR WINTER AND SPRING BEDDING.

Variegated Shrubs.

Aucuba japonica maculata—the old *Aucuba* of gardens.

Buxus argentea variegata.

„ *aurea* „

„ *japonica aurea*.

* *Euonymus radicans*.

* „ *japonica aurea variegata*.

* „ „ „ *marginata*.

* „ „ *alba* „

* *Eurya japonica variegata*.

* *Elæagnus pungens* „

* „ *maculata aurea*.

Erica vulgaris aurea.

Hedera arborea argentea variegata.

„ „ *aurea* „

„ „ *chrysophylla*.

* These are suitable for favourable situations only, being rather tender.

Shrubs with Green foliage.

Aucuba japonica mascula.

„ „ fœmina.

„ „ vera nana.

Andromeda floribunda.

Buxus sempervirens.

Berberis Aquifolium.

Cotoneaster microphylla.

Cerasus rotundifolia—the Laurel.

„ caucasica.

„ lusitanica.

„ „ myrtifolia.

**Euonymus japonica*.

**Elæagnus macrophyllus*.

Erica herbacea carnea.

„ vagans alba.

„ vulgaris Alportii.

Hedera arborea.

„ „ fructo lutea.

Kalmia latifolia.

Laurustinus. Dwarf French variety.

Ligustrum japonicum.

Phillyrea Vilmoriniana.

Rhododendron ponticum.

Skimmia japonica.

„ „ fragrans.

„ „ oblata.

Yucca gloriosa.

„ recurva.

* These are suitable for favourable situations only, being rather tender.

Conifers, Golden variegated.

Cupressus Lawsoniana lutea.

Juniperus chinensis aurea.

„ japonica „

Retinospora plumosa „

„ pisifera „

Thuya Vervœncana.

„ occidentalis lutea.

Conifers, Silver variegated.

Cupressus Lawsoniana alba variegata.

„ „ „ *spica nana.*

Juniperus japonica alba variegata.

Retinospora plumosa argentea.

Conifers, Bronze foliage.

Cryptomeria elegans.

Retinospora ericoides.

Conifers, Glauous foliage.

Abies pungens glauca.

Cupressus Lawsoniana Allumii,

„ „ *argentea.*

„ „ *Fraserii.*

„ „ *nana glauca.*

Retinospora squarrosa.

Conifers, Green foliage.

Cupressus Lawsoniana.

„ „ *Shawii.* One of the best.

„ „ *ericoides.*

„ „ *gracilis.*

Juniperus chinensis.

„ *Virginiana.*

DISEASES OF PLANTS.

By Mr. GEORGE MASSEE, F.L.S.

[Read May 11, 1897.]

EVERYDAY experience clearly shows that the cultivator of plants who does not take into consideration, and at the same time endeavour to guard against, the possible injury capable of being done by fungi to the plants under his charge, commits a mistake. This applies more especially to those cases where large numbers of plants of the same kind are grown close together. I have been informed by tomato growers that a loss of from £100 to

£200 is not unusual in the crop of a single house in cases where the disease has been exceptionally severe. Adopting the *pre-ventive* method, the cost of spraying and promptly removing suspicious plants from a large tomato-house would not cost more than £2, probably not nearly so much. Unfortunately the too general conservative spirit of our gardeners rebels against the idea of anticipation, and argues that it is absurd to expend money in combating a disease which does not in reality exist.

This indifference on the part of gardeners is fully explained by the still greater indifference displayed by the majority of those who profess to educate gardeners in all the branches appertaining to their profession; and in this respect it is, to say the least, a regrettable fact that our country is unique in not including in the programme of essentials, a broad knowledge of the life-history of those groups of fungi which are admittedly one of the pests of horticulture.

It is sometimes urged that practical gardeners have neither the time nor the inclination to become specialists in the study of fungi; an argument which is as unnecessary as unreasonable. What gardeners should know is, the broad outlines of the peculiar mode of life of injurious fungi, which differs so much from that of the plants with which they are most familiar. Armed with this amount of knowledge, the cultivator of plants would be able to anticipate the attacks of his foes, would be enabled to carry into practice the suggestions made by specialists on the subject of plant diseases; and, finally, would be able to convey in an intelligible form the symptoms of disease when asking for advice.

At present this, unfortunately, is not the rule; diseased plants are submitted wholesale, usually accompanied by the statement that the plants were quite healthy until a fungus showed itself on some particular part of the plant. The inevitable reply to such, that it is too late to effect a cure, and all that can be done is to prevent the spread of the disease, is naturally disheartening, and calculated to foster distrust as to the possibility of preventing disease. This unfortunate condition of things will be understood if it is remembered that when mushroom spawn is placed in a mushroom-bed, some considerable time is required for the spawn or *mycelium* to grow and spread, before mushrooms appear. The *mycelium* or spawn is in function the exact

equivalent of the roots and leaves of a flowering plant ; that is, it is that part of the fungus which takes in food, and when a sufficient quantity of food has been accumulated, the mushroom is produced on the surface of the bed. The mushroom, as commonly understood, is not the entire fungus, but only its fruit, which appears at the surface of the bed for the purpose of enabling its seeds or *spores* as they are called, to be distributed by wind or other agents. In like manner the *mycelium* of parasitic fungi is present in the tissues of the living plants on which they grow, long before the fruit of the fungus appears on the surface. As a matter of fact, when the fungus appears on the surface of the plant it represents the last stage of the disease and not the first ; the injury has been done ; the *mycelium* has been absorbing the food prepared by the plant for its own use, the plant-cells are destroyed by the *mycelium*, and the fruit of the fungus appears on the surface of the diseased plant for the purpose of being carried by wind, insects, or spraying, on to the leaves of other healthy plants, where the same course of development takes place.

From the above account it will be seen how very necessary it is to remove all traces of fungi that appear on living plants, either by removing and burning the diseased parts, or when it is not desirable to do this, then to spray or wash the affected plants with some solution that will destroy all spores present. If this method of promptly destroying all traces of fungi on their first appearance is persistently carried out, there is but little fear of an outbreak on a large scale, as it is quite as impossible for fungi to appear in the absence of fungus spores as it would be to expect a crop of peas to spring up without having previously sown the seed necessary for producing the same. The gardener should accustom himself to treat every fungus, large or small, mildew or toadstool, in the same manner that he treats weeds in a seed-bed, as something that may do a great deal of injury, but which cannot possibly do any good. The spores of fungi are exceedingly minute, and are readily carried by currents of air, insects, birds, animals, &c., from one place to another, and if such spores alight on the damp surface of a leaf of the particular plant on which the fungus is parasitic, the spore germinates at once, and within a very short time the *mycelium* has pierced the skin of the leaf and entered the tissues,

where it finds an abundance of food, and soon spreads through the entire leaf. When this has taken place, it is too late to spray; no solution can kill the *mycelium* present in the plant-cells without also killing the leaf. The aim of the gardener should be, by exercising the methods indicated above, to prevent such inoculation from taking place, by a continuous warfare against every form of fungus making its appearance. As a rule a parasitic fungus attacks only one particular kind of plant, or closely allied plants belonging to the same natural order; consequently, where numerous plants of the same kind are grown in close proximity, it is necessary that a very sharp look-out should be kept, and any plant showing symptoms of disease should be promptly removed, and if of little value, be destroyed; or if too valuable it should be removed from the rest; as, should the disease prove to be of a fungoid nature, neglect may result in disaster. Unfortunately the gardener's idea of a disease is generally the simultaneous collapse of numerous plants, which in most cases originates from a single individual being attacked in the first instance; therefore never delay doing all that can be done, by promptly removing suspicious individuals, and afterwards spray the entire batch of plants with some fungicide, so as to destroy any spores that may possibly have spread from the diseased plants before removal. It is not sufficient to pull up a suspected plant and throw it down in a corner to die; the plant so treated would in all probability die, but if it was attacked by a fungus, the latter would not perish also, but continue to grow and produce spores just the same as if the plant had been allowed to stand. For the same reason, diseased plants should not be thrown on to a rubbish heap, but thoroughly destroyed by burning.

Most fungi differ very considerably from other plants in producing two or more kinds of spores or reproductive bodies, which serve different purposes. During the summer months most parasitic fungi produce in rapid succession myriads of very minute spores which are capable of germination the moment they are ripe; these spores are distributed wholesale by wind, rain, &c., and those that happen to alight on the leaf or young branch of the plant on which they are capable of growing, germinate and enter the tissues at once. By this means a disease, when once present, spreads rapidly. A single mildewed apple

leaf may be the means of infecting an entire orchard within a very short time, or a single "rusted" leaf of wheat may be the means of destroying the prospect of a crop. At this state the value of spraying is obvious; by applying a fungicide the spores are destroyed, and the spread of the disease considerably checked. The minute spores described above are known as summer-spores, which, as already stated, germinate the moment they are ripe, their use being to enable the fungus to extend its area, and this method continues so long as the plant on which the fungus is parasitic continues to grow actively. During the autumn, when the *host-plant*, as the plant is called on which a fungus is parasitic, is ceasing vigorous growth, the *mycelium* of the fungus, which during the earlier part of the year has given origin to summer-spores, now begins to produce a totally different kind of spores, called *winter-spores* or *resting-spores*. These winter-spores remain dormant during the winter, and germinate the following spring, at the time when the leaves of the host-plant are unfolding, their use being to tide the fungus over that period of the year when the host-plant is not in active growth.

From the above account it will be seen how very important it is to collect and burn all diseased leaves and twigs, and not allow them to remain on the ground under the plants from which they have fallen. It is true that such diseased leaves, if allowed to lie on the ground, usually decay and disappear during the winter; but the resting-spores present in the tissues of such diseased leaves do not perish, but remain in the soil and germinate in due season, and in all probability a renewal of the disease will follow. Here again is a case where preventive measures should be resorted to. Where a disease has been known to exist during the previous season, the plants should be sprayed at intervals of ten days during the period of the expansion of the leaf-buds with a fungicide; as, notwithstanding every care in the removal of diseased parts, it is probable that spores may be lurking in crevices of the bark, &c., and the fungicide would destroy all such, and greatly lessen the chance of a return of the disease. For spraying purposes a solution, consisting of half an ounce of potassium sulphide dissolved in a gallon of water, may be used; this will destroy most germinating spores, and, being clean, may

be used wholesale in greenhouses and places where Bordeaux mixture could not be used, on account of the white-wash effect produced on everything with which it comes in contact. Potassium sulphide dissolves most readily in hot water, which should be allowed to cool before spraying. Orchard trees or vines that have been attacked by fungi the previous season may be sprayed with a solution of sulphate of copper—one ounce to three gallons of water—for the purpose of destroying resting-spores. This fungicide can only be used early in spring, before the leaf-buds begin to expand, otherwise the foliage is injured; hence it cannot be used in greenhouses and places where foliage is present.

Numerous other preventive methods and fungicides have been proved to be of value in checking specific diseases, but the leading idea of this discourse is to give gardeners an idea as to the varied methods followed by fungi in attacking their victims, and more especially to thoroughly impress on their minds that "prevention is better than cure."

One group of very destructive parasitic fungi possess the peculiarity of living on two distinct host-plants at different periods of their existence. The too familiar mildew or rust of wheat is an example of this kind, where two conditions of the fungus grow on the wheat-plant, and a third on the leaves of the barberry. Other examples pass one period of their existence on branches of junipers, and another on the leaves of various fruit trees. It is obvious that in those cases where it is necessary for the fungus to pass from one host-plant to another to complete its development, that the removal of one of the two host-plants from the vicinity will arrest the progress of the disease. Various other peculiarities possessed by fungi, which it is impossible to crowd into a single talk on the subject, should be known to gardeners.

The following illustrations of the mode of attack of well-known forms of parasitic fungi will, it is hoped, enable the previous remarks to be more clearly understood:—

ORCHID LEAF RUST. (*Glaeosporium cinctum*, Berk.)

This is the most generally distributed of fungus parasites with which the cultivator of orchids has to contend. It does not as a rule kill the host-plant, but the leaves are disfigured by

its presence, and in addition to robbing the plant of a certain amount of material elaborated for its own use, proves injurious in rupturing the epidermis in many places, and thus facilitating the escape of water from the leaf, and, as a consequence of which, the balance of absorption and transpiration is upset. This fungus may be considered as a very simple type of parasite, inasmuch as, so far as is known, only summer-spores are formed, but as the leaves of orchids are always present, the spores find a suitable place for germination throughout the year; secondly, the fungus completes its development on one and the same host-plant.

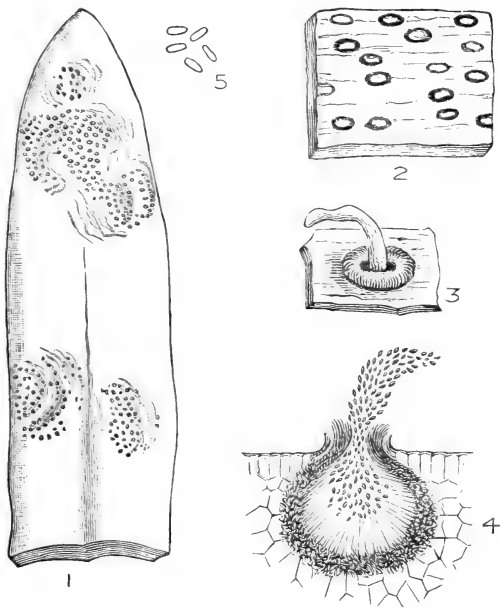


FIG. 1.—ORCHID LEAF RUST (*Glæosporium cinctum*).

(1) Portion of an orchid leaf showing the disease: natural size. (2) Portion of a diseased patch, slightly magnified. (3) A fungus fruit showing the spores escaping in the form of a tendril; more highly magnified. (4) Section or slice through a fungus fruit imbedded in the substance of an orchid leaf; highly magnified. (5) Spores of the fungus; magnified 400 times.

Inoculation takes place by the spores being conveyed by some means on to the surface of a damp orchid leaf, germination takes place at once, and within a few hours the *germ-tube*, or first-formed *mycelium* produced by the germinating spore

pierces the epidermis of the leaf, and enters the tissues, where it spreads in the interior of the leaf-cells, finally rupturing the epidermis to form its spores on the surface of the leaf.

The fruit appears in small patches a quarter to half an inch across; these patches are at first pale green, then yellowish or almost white, and in the case of fleshy leaves, sunk a little below the general surface of the leaf, as if they had been pressed down by the tip of a finger. When examined with a pocket-lens each fruit, of which there are several on each pale patch, is seen to be surrounded by a blackish ring, hence the specific name of the fungus.

The potassic sulphide solution mentioned above destroys the germinating spores of this fungus, and as the parasite has been observed on several different kinds of orchids, spraying all the plants present in a house where the pest has been observed, is necessary.

ROSE LEAF MILDEW (*Sphærotheca pannosa*, Lév.).

This parasite appears in the spring or early summer as a



FIG. 2.—ROSE LEAF MILDEW (*Sphærotheca pannosa*).

Early summer form of the disease. (1) A diseased rose leaf; natural size. (2) Summer spores, produced in chains; highly magnified. (3) A single summer-spore germinating; magnified 300 times.

white or greyish mildew on the leaves and young shoots of rose trees. When the disease is abundant it also attacks the fruit.

If a portion of this delicate grey mildew is examined under a microscope, it will be seen to consist of a delicate felt of interwoven *mycelium* resting on the surface of the leaf, and sending numerous short suckers into the cells of the leaf on which it is parasitic, for the purpose of absorbing food. When the *mycelium* has been growing for some time it presents a delicately frosted appearance, due to the presence of numerous upright strings of exceedingly minute *conidia* or summer-spores. These spores are scattered by wind as soon as they are ripe, and germinate at once; and as these bodies are produced in rapid succession throughout the summer months, it is easy to understand how the disease spreads so rapidly after it once appears.

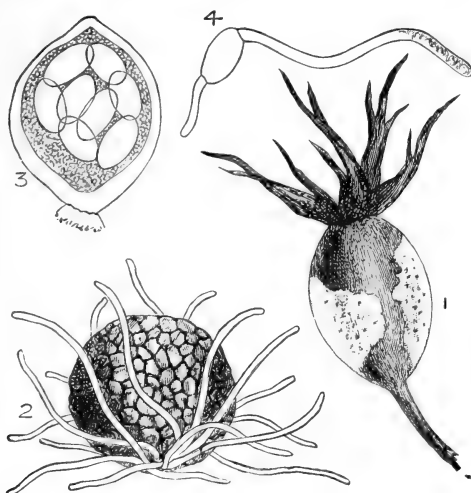


FIG. 3.—ROSE LEAF MILDEW (*Sphaerotheca pannosa*).

Winter form of the disease. (1) A rose fruit showing the winter-spore condition in the form of minute black dots on the white mould; natural size. (2) A winter-fruit; highly magnified. (3) A cell containing eight winter-spores; several of these cells are produced in a fruit; highly magnified. (4) A single winter-spore germinating; magnified 300 times.

If the white patches of mould, especially those present on the more persistent parts of the rose tree, as young fruits and shoots, are examined in August and throughout the autumn, minute points not so large as a pin's head will be seen in considerable quantity; these are at first yellow, and finally blackish, and are in reality fruits of a complex structure, containing in their interior numerous winter-spores. If taken in hand

sufficiently early, spraying with potassic sulphide will check the spread of the summer-spore condition, and consequently prevent the formation of winter-spores, which remain dormant during the winter, and germinate the following spring just about the time when the leaf-buds have expanded. Diseased leaves that have fallen should be collected and burned, otherwise the resting-spore stage will develop on the dying leaves. All mildewed twigs and fruits should also be cut away, otherwise the resting-spores or winter-spores which are developed on these parts will with certainty renew the disease the following spring. The entire life of the fungus is spent on the rose tree.

VELVETY MOULD. (*Sclerotinia Fuckeliana*, De Bary.)

This fungus has two very different looking kinds of fruit. The summer condition, which is the commonest of the two, is often called *Botrytis cinerea*, and appears under the form of an olive-coloured or brownish mould, which forms a velvety layer on almost every kind of dead or decaying vegetable matter. Unfortunately this mould also attacks living plants, and of late years has frequently proved a serious pest to vines, appearing on the leaves, young shoots, and also on the inflorescence. The *mycelium* of the fungus lives in the tissues of the host-plant, and the external mould consists of myriads of upright stems which are branched above, each branchlet bearing a cluster of summer-spores at its tip. These spores are produced with great rapidity, and possess the power of germinating as soon as mature, consequently the disease spreads rapidly after its first appearance, unless stringent measures are resorted to, to check its progress. As already stated, this condition of the fungus can live and produce fruit on dead as well as on living parts of plants; consequently, when all the leaves of the vine or other plant on which the fungus was parasitic have disappeared, the summer-spores germinate and grow on dead leaves or any fragments of plants lying about, and by this means keeps itself going until the young leaves of its host again appear, when they are promptly attacked. Every gardener must be familiar with this grey mould as it occurs on the branches of geraniums and various other plants that have died back, also on dead, dried up leaves, &c., on the soil of plant pots and on the ground. Under

certain conditions, not fully known, the *mycelium* of this fungus grows into minute blackish compact lumps called *sclerotia*. These bodies remain in a resting condition for some time, and eventually produce fruits resembling in shape a miniature wine-glass, quarter to half an inch high, and of a dark brown colour. This form of fruit is produced in the spring, and its spores give origin to the summer, or *Botrytis* form of the disease. If the mould shows itself, the plants should be sprayed at intervals of ten days with a solution of potassium sulphide, and in cases where it is known that the disease has previously existed, the

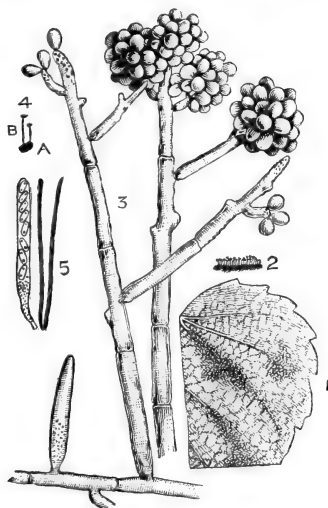


FIG. 4.—VELVETY MOULD (*Sclerotinia Fruckeliana*).

(1) Appearance of the summer form of the disease on a portion of a vine leaf; half natural size. (2) Fruit of summer form; natural size. (3) Fruit of summer form; highly magnified. (4) Winter fruit; (A) sclerotium, from which too small stalked cups spring; (B) one-quarter natural size. (5) Spores of winter fruit; highly magnified.

vines should be sprayed, *only* before the leaf-buds begin to expand, with a solution of sulphate of iron. As a matter of course all diseased leaves that have fallen should be collected and burned; and every trace of the mould, as it appears on dying parts of plants should be destroyed. It is useless picking off a diseased leaf or twig, rubbing it to powder between the fingers, and throwing it down, on the supposition that the fungus is destroyed; this is not the case, the very minute spores are only spread about by this method.

The present, or a very closely related fungus, does immense injury to lilies, daffodils, snowdrops, and allied plants, and in such cases it is not wise to continue cultivating similar plants in those places where the disease has once appeared, as the sclerotia of the fungus are formed in the soil, and a repetition of the disease is almost certain.

PEAR LEAF CLUSTER-CUP. (*Gymnosporangium Sabinae*, Wint.)

This fungus grows on two different host-plants at different periods of its existence. The spring stage grows on various kinds of juniper, especially *Juniperus Sabina*, bursting through the bark in April and May under the form of reddish-brown gelatinous masses, quarter to half an inch long. These masses consist of myriads of spores, which germinate without falling away from the sticky masses on which they are formed, and produce a crop of still smaller, secondary spores. These secondary spores are carried in the air by currents, and such as happen to alight on the damp surface of pear leaves commence to germinate at once, and soon enter the tissues of the leaf. About a fortnight after the infection of a leaf, clusters of minute cylindrical bodies burst through the epidermis of the leaf. These little bodies are popularly known as cluster-cups; the outside cover splits into shreds at the tip, and liberates the minute spores contained in its interior. The spores produced in the cluster-cups, curiously enough, cannot again directly infect pear leaves, but must be conveyed by some agent on to the branch of a juniper, where they germinate, enter the tissues, and in due course give origin to the gelatinous masses already described, the spores of which, in turn, cannot infect the kind of tree on which they are produced, but must find their way on to the surface of young pear leaves. When pear leaves are badly attacked they fall early in the season, thus affecting the existing fruit crop, and also that of the following season, as the wood is not properly matured, and there is a lack of reserve material. It is important to remember that the infected pear leaves will not infect other pear trees, but only juniper trees, and that when the pear leaves have fallen the pear tree is perfectly free from disease; that is to say, the *mycelium* of the fungus does not spread from the leaves into the branches. On

the other hand, when a juniper is once infected, the *mycelium* is perennial in the branch, and produces a crop of fruit each spring without any further inoculation.

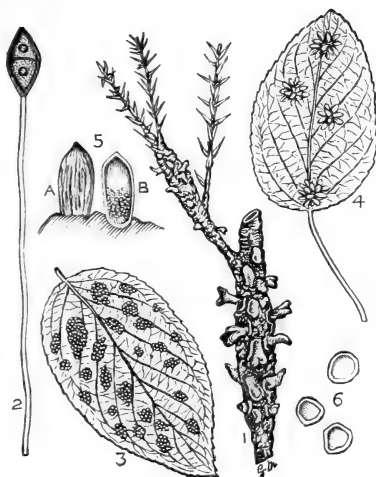


FIG. 5.—PEAR LEAF CLUSTER-CUP (*Gymnosporangium Sabinae*).

(1) The spring form of fruit growing on juniper ; one-quarter natural size. (2) A single spore of the spring form growing on juniper ; magnified 300 times. (3 and 4) The summer or cluster-cup form of fruit growing on living pear leaves ; half natural size. (5) Two cluster-cups ; (A) closed, (B) cut open to show the spores in its interior ; slightly magnified. (6) Spores from a cluster-cup ; magnified 300 times.

As it is absolutely necessary for the existence of this fungus that it should spend part of its time on a juniper, and part on a pear tree, it is obvious that if one of its two host-plants is removed the disease would cease to exist. A single diseased juniper is quite sufficient to infect all the pear trees growing in its neighbourhood ; therefore, if the disease shows itself, seek out the juniper, and remove it altogether. If that is not desirable, the infected branches should be cut away. These are readily recognised by the gouty swellings caused by the fungus, as well as by the gelatinous masses of the fungus itself projecting from cracks in the bark.

Several other rosaceous plants, as hawthorns, apples, &c., have their leaves and fruit attacked by cluster-cups, one stage of which also develops on species of juniper ; hence the suggestions given above will suffice for the removal of the parasite.

TREE ROOT ROT. (*Agaricus melleus*, Vahl.)

This fungus belongs to the group commonly known as "toadstools," and grows in dense clusters at the roots of trees and around stumps. Every part except the gills is dingy yellow or honey colour; the cap is two to three inches broad, and the stem four to six inches long, with a torn frill or ring placed about an inch from the top. The gills are white. This fungus grows readily on decaying wood, and in some cases



FIG. 6.—TREE ROOT ROT (*Agaricus melleus*). One quarter natural size.

appears to grow in the soil; but in such cases, if carefully examined, it will be found to spring from buried wood, roots, &c. The *mycelium* or spawn forms thin, blackish, cord-like strands, which run a few inches under the soil for a distance of many yards from the parent plant. If one of these strands happens to come in contact with a young root-branch of a growing tree, the *mycelium* soon enters the tissues of the root, where it spreads rapidly, both in the root and in the soil, attacking every rootlet with which it comes in contact, until eventually every portion of the root becomes covered with a white, cottony

layer of *mycelium*. At this stage the general appearance of the tree clearly shows that something is wrong ; the *mycelium* spreads up the trunk between the bark and the wood, and also forms dense clusters of toadstools round the base of the trunk, and finally the tree dies. Soon after a tree is attacked, and the fungus is thoroughly established, strands of *mycelium* radiate in the soil in every direction in search of fresh victims. It thus frequently happens that when the disease is once established in an orchard, several trees are attacked in succession, inoculation taking place by the underground *mycelium* attacking the roots. The spores of the fungus cannot enter an unbroken surface of the tree, but grow readily on any wounded surface of the trunk near the base, on broken exposed roots, &c. The fungus under consideration attacks not only nearly all kinds of fruit trees, but also forest and ornamental trees, including conifers. Whenever the fungus appears it should be destroyed, not by the usual method of kicking it over, and stamping on it, but by either burying or burning. When clusters of the toadstool grow round the base of a living trunk, it may be taken for granted that the roots are more or less attacked. In such cases the fungus should be cut out, and the wound protected against further chance of infection by a coating of tar. The roots should also be examined, and if found to be more or less covered with white *mycelium*, should be freely dressed with sulphur and again covered. When a tree is attacked it is advisable to isolate it, by digging a narrow trench nine inches deep round the trunk at a distance of three yards away, so as to check the spread of the underground *mycelium*, and prevent its reaching the roots of other trees. The soil removed in making the trench should be kept within the trench, and not thrown outside the infected area.

Other kinds of toadstool also grow in dense clusters round the base of trunks, stumps, decaying posts, &c., but differ from *Agaricus melleus* in having dark-coloured gills and spores, whereas in *A. melleus* the spores and gills remain white.

It may be mentioned as an observed fact that more than one valuable tree has been killed by the careless use of the grass-cutting machine, the base of the trunk or exposed roots having been wounded, such wounds serving as a starting point for the germinating spores of this agaric.

THE PHYSIOLOGY OF PITCHER-PLANTS.

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OF all the remarkable and varied modifications of the members of the plant-body, perhaps none are more striking or have excited greater interest than the now familiar "pitchers." They are striking owing to the variety and sometimes beauty of form and colour which they present; they are interesting on account of the morphological and physiological problems which they suggest. It is impossible for me to discuss their morphology, that is their development and general structure, what parts of the plant enter into their composition, and what resemblances and differences exist between them in this respect: for were I to attempt this, it would prevent me from doing justice to the topic which I have selected as the subject of this lecture, namely, their function and use. I shall, therefore, only incidentally allude to this aspect of the matter.

The number of genera in which structures, fairly coming under the designation of "pitchers" occur, is considerable; and are as follows, arranged in their Natural Orders as determined in the "Genera Plantarum" of Bentham and Hooker. Taking first those which are undoubted "pitcher-plants," we have:—

- (1). *Sarraceniaceæ*; *Sarracenia*, *Darlingtonia*, *Heliamphora*.
- (2). *Nepenthaceæ*; *Nepenthes*.
- (3). *Asclepiadaceæ*; *Dischidia* (in a few species, of which only *D. rafflesiana* has been fully investigated).
- (4). *Saxifragaceæ*; *Cephalotus*.

To these may be added the *Utriculariæ* with their curious "bladders," which, in spite of their divergent form, are essentially "pitchers":

- (5). *Lentibulariaceæ*; *Utricularia* (nearly all species), *Genlisea*, *Polypompholyx*, *Biovularia*; which are all rootless plants:—and to render the account of the physiology of these structures complete, mention must be made of the curious hollow subterranean scale-leaves of *Lathræa Squamaria* (*Orobanchaceæ*); as also of some Liverworts (*e.g.* *Frullania*).

Thus, apart from the pitched Liverworts, we find that pitchers

occur in eleven genera (including *Lathræa*) of Phanerogams belonging to six more or less widely separated dicotyledonous Natural Orders. With regard to their respective habitats, these plants are mostly either aquatic and floating (many species of *Utricularia*), or such as grow in more or less damp soil; *Dischidia*, however, is an epiphyte growing on trees, and therefore in a dry situation; whilst *Lathræa* grows in woods, being parasitic on the roots of trees.

I will only say, with regard to the general morphology of the pitchers, that each pitcher is either an entire specially modified leaf, or less commonly (*e.g.* *Nepenthes*, often in *Utricularia*) a specially modified part of a leaf. They vary widely in size, being often several inches, or even two feet or more long in the *Sarraceniaceæ*, whilst in *Utricularia* they are minute and delicate in structure. This difference in size and consistence is recognised in the technical terms which have been applied to these structures. Thus, Linnæus ("Amoen. Acad.," vol. 6, p. 232, 1763; also, "Philosoph. Bot.," Rose's Engl. Edn., p. 247, 1775) distinguishes the bladders of *Utricularia* as *folliculi*, from the pitchers of *Nepenthes* and *Sarracenia* which he terms *utriculi*; similarly, Willdenow ("Principles of Botany," Engl. Edn., p. 80, 1811) designates the pitcher by the still accepted term *ascidium*, and the bladder by the term *ampulla*.

A point of special interest is the fact that in some genera (*Sarraceniaceæ*, *Nepenthes*, *Cephalotus*) the pitchers are closed during the early stages of their development. The opening is effected in the *Sarraceniaceæ* by a splitting of the tissue in the middle line of the ventral surface of the pitcher near its apex, so that a narrow aperture, with a well-developed margin, is formed, which enlarges with the subsequent growth of the pitcher. In pitchers with this mode of dehiscence the apical portion beyond the aperture is often considerably developed into a broad flattened (as in *Sarracenia*) or inflated "hood" (as in *Darlingtonia*). In *Nepenthes* and *Cephalotus*, on the contrary, the dehiscence of the pitcher closely resembles the circumscissile dehiscence of such fruits as those of the Pimpernel and the Henbane, so that a lid or operculum is distinctly marked off, remaining attached to the rim of the pitcher by a narrow articulation. In describing these various pitchers the term "operculate" has been used indiscriminately, whereas it is clear

that it can only be appropriately applied to those of *Nepenthes* and *Cephalotus*; probably the "hood" of *Sarracenia* and *Darlingtonia* is not homologous with, any more than it is analogous to, the "lid" of these two genera. When once open, the pitchers remain so. In fact, in the great majority of cases, direct access to the interior of the pitcher is offered; the only exceptions being *Utricularia* and *Polypompholyx*, where the aperture is closed by a valve which opens inwards.

The pitchers are borne in somewhat different positions in different plants. Thus in *Nepenthes* and *Dischidia*, they are distributed over the length of the stem, and in *Utricularia* over the leaves or the shoots; in *Sarracenia*, *Darlingtonia*, *Heliamphora*, *Cephalotus*, *Genlisea*, they are borne in a cluster at the surface of the ground, after the manner of radical leaves. In the latter case, the leaves may all be pitched, as in *Sarracenia*, *Darlingtonia*, and *Heliamphora*, though in the latter some of the leaves tend to develop a flattened blade; or the pitched leaves may alternate with ordinary foliage-leaves, as in *Cephalotus* and *Genlisea*. In most cases the pitchers are freely exposed in the medium, be it air or water, in which the plant is living; but in the terrestrial *Utricularias*, and in *Genlisea*, this is not so. Goebel ("*Pflanzenbiologische Schilderungen*," ii., 1891, p. 145; "*Biologie von Genlisea*," *Flora*, 1893) has shown that these *Utricularias* develop runners or rhizomes which penetrate the substratum upon which the plant is growing, and thus it comes about that the bladders borne on these runners are subterranean: and further, that the long slender pitchers of *Genlisea* curve downwards to the soil, penetrating it by means of the two long apical appendages which enter the soil after the manner of awned fruits such as those of *Stipa pennata* or *Erodium*. Similarly the scaly leaves of *Lathræa* are subterranean. Thus pitchers may be either suspended in the air, partially or completely immersed in water, or buried in the soil, conditions which must obviously have an important bearing upon their functions.

The history of pitcher-plants is a long one. *Sarracenia*, the first of them to be described, was figured by Clusius ("*Rar. Plant. Hist.*," lib. iv.) in 1601, under the name *Limonium peregrinum*, and was subsequently mentioned in Morison's "*Plant. Hist. Oxon.*," iii., 1699, as *Coilophyllum virginianum*; it was

renamed *Sarracena* by Tournefort ("Inst. Rei. Herb." i., p. 567) in 1700; and this name, altered to *Sarracenia*, was adopted by Linnæus in his "Genera Plantarum." *Nepenthes* was discovered in Madagascar by Flacourt ("Descrip. Insul. Madagascar"), the governor of that island, about the middle of the seventeenth century, and was called *Anramatiko* by him. Shortly afterwards another form of it was found in Ceylon by Paul Hermann to which the name *Bandura Cingalensium* was given by Paul Amman ("Char. Plant. Nat.," 1685, p. 194); an account of this plant was also given by Hermann Nicolaus Grimm ("Ephem. Acad. Nat. Curios.," ann. I., Dec. 2, 1682). Breyne ("Prod. Fasc. Rar. Plant.," I., 1680, p. 18) says of the plant:—"Banduræ ramum, foliis, folliculis, floribusque condecoratum, ab Excellentissimo atque Magno illo Botanico Domino Hermanno pulchre siccatum, et ex Zeilan Insula transmissum, Domini Commelyni Senatoris Amstelodamensis gratiæ debeo," and subsequently, in the second part of his "Prodromus" (1689), he proposed the generic name *Nepenthes* (describing the Ceylon plant as *Nepenthes zeylanicum flore minore, nobis*), a name which was adopted by Linnæus. Other forms were discovered and variously named at different times; for instance, one by Rumph (in the Malay Archipelago), as *Cantharifera* ("Herb. Amboinense," V., p. 121, 1782), and another by Loureiro ("Fl. Coch.," II., p. 744, 1790) as *Phyllamphora mirabilis*.

The next of these plants to be described was *Utricularia*, which is figured by Rivinus in his *Ordo Plantarum quæ sunt flore irregulari monopetalo*, 1690, under the name *Lentibularia*, for which Linnæus substituted the name *Utricularia*. Then, after a long interval, came *Cephalotus* and *Dischidia*, both of which are associated with Robert Brown. Though *Cephalotus* was discovered by Labillardière ("Nov. Holl. Pl.," ii. 6, t. 145) in 1806, the best accounts of the plant are those given by R. Brown, first in "Flinders' Voyage to Terra Australis," 1814 (Works, Vol. i.), and secondly, in a special paper published in 1832, (Works, Vol. ii.). *Dischidia* was discovered by Sir Joseph Banks, in Australia, on the occasion of his visit in 1770, and was subsequently named and formally described by R. Brown, in a paper on the *Asclepiadæ*, which was read before the Wernerian Natural History Society in 1809 (republished in Works, Vol. ii.); but, curiously enough, he gives in this paper no special account

of the pitchers of *Dischidia*, but reference is made to them in the paper on *Cephalotus* already mentioned.

With regard to the history of the remaining genera, *Heliamphora*, discovered by R. Schomburgk in British Guiana, was described by Bentham ("Trans. Linn. Soc.") in 1841: *Darlingtonia*, discovered in California, by Brackenridge in 1842, was named and described by Torrey ("Smithsonian Contributions," vi.) in 1854; and *Genlisea* was discovered in Brazil by St. Hilaire ("Ann. d. sci. Nat." sér. ii., tome ii., 1839).

After this brief historical sketch of the discovery and determination of the genera, we pass to the consideration of the various theories which have at different times been propounded as to the use of the pitchers. Such views were naturally expressed first with regard to *Sarracenia*. The fact which seemed especially to call for explanation was the presence of watery liquid in the pitchers. Thus Catesby says ("Nat. Hist. of Carolina," ii. 1754) — "The hollows of these leaves always retain some water, and seem to serve as an asylum or secure retreat for numerous insects, from frogs and other animals which feed on them." Linnæus, in his "*Systema Naturæ*" (Ed. xiii. ii. p. 361, Vindob., 1770), regards the pitchers as reservoirs of water for the needs of the plant, which he considers to resemble the *Nymphæas*: "*Sic metamorphosis folii Nymphææ in folium Sarraceniæ, ut ipsa aquam pluvialem excipiens et retinens extra aquas crescat: mira naturæ providentia!*" But unfortunately he gave up this comparatively rational view for the idea that the object of the pitchers was to supply thirsty birds with water:—"Folium *S. purpuræ* in Spec. Plantarum descriptum, aquam præbet sitientibus aviculis" ("Prælect. in Ord. Nat. Plant.," Ed. Giseke, 1792, p. 316). Possibly Linnæus' earlier and more reasonable conjecture may have been suggested to him by Peter Collinson on sending him some specimens of *Sarracenia*, with a letter (quoted by Smith, "Correspondence of Linnæus"), dated from London, Sept. 17, 1765, in which he says:—"As you so justly admire the *Sarracenia* as one of the wonders of the vegetable kingdom, that you may have a more perfect idea of the wonderful reservoirs which retain the water to supply the plant in great droughts, I send you two leaves." In a postscript to this letter, Collinson first draws attention to the presence of insects in the pitchers. He says:—"Many leaves grow round the centre bud of

the *Sarracenia*, which make a pretty appearance with their mouths open to catch the rains and dews; but many poor insects lose their lives by being drowned in these cisterns of water." It should also be mentioned that Bobart (in Morison, "Plant. Hist. Oxon.," iii., p. 533, 1699) had suggested that the aperture of the pitcher was opened and closed from time to time by the change in position of the lid, or rather the hood, working as it were on a hinge. Of *Coilophyllum virginianum brevioris folio*, he says:—"In suprema folii parte labrum latum subrotundum est . . . operculi vicem præstans, cardinis motu donatum, quo os cavitatis frequenter contegitur;" and of another species (*longioris folio erecto*):—"In summo uniuscujusque ad unum latus, labrum tegumentumve prominens enascitur, quod in his speciebus operculum est, quod divina providentia ad obtegendam et defendendam plantam a pluviarum injuriis statutum videtur, et theculam scloppetii aut vasis lignei operimentum haud inepte refert." Linnæus at one time adopted the view of the mobility of the lid, for we find him saying, in his "Hortus Cliffortianus" (1737, p. 497):—"Folia harum uti nepenthes folia folliculo constant, qui operculo, cardinis motu quasi donato, claudi potest et aperiri."

An important step onwards was made by Sir J. E. Smith, early in the present century. In his "Introduction to Physiological and Systematic Botany" (I quote from the 2nd Edn., 1809, p. 195), after giving Linnæus' view of the use of the pitchers as reservoirs of water, he goes on to say:—"But the consideration of some other species renders this hypothesis very doubtful. *Sarracenia flava* and *S. adunca* are so constructed that rain is nearly excluded from the hollow of their leaves, and yet that part contains water which seems to be secreted by the base of each leaf. What then is the purpose of this unusual contrivance?" He then alludes to the constant presence of dead insects in the pitchers in these terms:—"The *S. purpurea* is usually observed to be stored with putrefying insects, whose scent is perceptible as we pass the plant in a garden; for the margin of its leaves is beset with inverted hairs, which, like the wires of a mouse-trap, render it very difficult for any unfortunate fly that has fallen into the watery tube, to crawl out again. Probably the air evolved by these dead flies may be beneficial to vegetation, and, as far as the plant is concerned, its curious construction may be designed to

entrap them, while the water is provided to tempt as well as to retain them."

Sir J. E. Smith here makes two valuable and original suggestions : (1) that the pitchers are capable of secreting liquid ; and (2) that their use is to entrap insects, which may serve to nourish the plant. The correctness of the second suggestion was soon confirmed. Macbride, in a letter addressed to Sir J. E. Smith, dated April 11, 1815 ("Trans. Linn. Soc.," xii., 1815), points out that in *Sarracenia flava* and *adunca (variolaris, Michaux)*, insects are attracted to enter the pitchers by a sugary secretion produced by glands on the internal surface near the mouth. The matter was subsequently further investigated by Mellichamp, whose results are given by the late lamented Asa Gray, in an article contributed to the "New York Tribune," and reproduced in the "Gardeners' Chronicle" for 1874. Mellichamp devoted his attention to two questions : (1) Is the liquid in the pitchers merely rainwater, or is it a secretion ? (2) Can the pitchers digest the insects which they catch ? He concluded, with regard to the first question, that the pitchers can secrete liquid, because he found a few drops of liquid in unopened pitchers when there had been no rain for some days ; and because he also found liquid in pitchers to which the admission of rainwater is next to impossible on account of the overhanging hood. The second question he answered in the negative, because he found that small pieces of venison immersed in the liquid in a pitcher did not undergo more rapid change than similar pieces kept in water, though in the former case the meat "became more offensive to the nostrils" than in the latter. Asa Gray adds :—"The only inference to draw is that the liquid hastens decomposition, for it seems to me that decomposition, not digestion, is what it comes to." Mellichamp himself speaks of the flies, &c., becoming "liquid manure." In the same year (1874), in his Presidential Address to the Section of Zoology and Botany of the British Association (Belfast), Sir J. D. Hooker treated of this subject, and says :—"It is known that *Sarracenia flava* secretes fluid, but under what precise conditions I am not aware" ; and of *S. variolaris* :—"That it secretes a fluid noxious to insects there is no doubt, though in the specimens examined I found none." He concludes :—"The fact that insects normally become decomposed in the fluid of all, would suggest the pro-

bability that they all feed on the products of decomposition ; but as yet we are absolutely ignorant whether the glands within the pitchers are secretive or absorptive, or both ; if secretive, whether they excrete water or a solvent ; and if absorptive, whether they absorb animal matter or the products of decomposition." Some years later, Schimper ("Bot. Zeitung," 1882) made some observations like those of Mellichamp and with the same results, and adduces evidence to show that the products of decomposition are, as a matter of fact, absorbed by the pitchers. Finally, Goebel has recently come to the same conclusion ("Pflanzenbiologische Schilderungen," ii. 1891, p. 166), partly on account of experiments with *S. illustrata* (a hybrid between *S. flava* and *S. purpurea*), and partly on anatomical grounds.

If any further evidence is needed to prove that the pitchers of *Sarracenia* are organs for the capture of insects, it is afforded by the anatomical features presented by their internal surface. Generally speaking, this surface presents the following varieties of structure:—The "hood" bears a few scattered downwardly directed hairs, and, especially towards its lower part, a number of glands which secrete honey. Next to this is a smooth slippery surface, which extends for a short distance below the orifice of the pitcher ; this is followed by a much longer region bearing stiff hairs pointing downwards, amongst which are some glands ; and towards the bottom of the pitcher the hairs cease and the surface is smooth. This arrangement produces an admirable insect-trap. Insects are attracted to the mouth of the pitcher by the honey secreted about it ; they slip on the smooth surface upon which the honey-glands border and fall down in among the hairs below, which offer an almost insuperable obstacle to their climbing out again.

To summarise what has been said as to the function of the pitchers of *Sarracenia*, it is evident that they are undoubtedly organs for the capture of insects, and it is equally clear that the captured insects contribute to the nutrition of the plant. It is also most probable that the insects undergo decomposition and not digestion ; for there do not appear to be any glands in the pitchers to secrete a digestive enzyme ; and, moreover, many observers have noticed the presence of living maggots in the pitchers which would be impossible were a digestive liquid

present. But there remains one point which requires further investigation, and that is as to how the pitchers come to contain liquid. Whilst it is true that in those pitchers in which the orifice is not protected by the hood, the liquid which they contain may be rainwater, the observations of Mellichamp suggest the probability of a secretion of liquid by the pitcher.

The pitchers of *Darlingtonia* and *Heliamphora* so closely resemble those of *Sarracenia* in structure, that there can be no doubt that their function is essentially the same in all these genera. It will not, therefore, be necessary to enter upon a separate consideration of these two genera.

We pass now to the consideration of the pitchers of *Nepenthes*. The early observers duly noted the frequent presence of liquid in the pitchers, and they do not seem to have doubted that the liquid was secreted by the pitchers; the prevalence of this conviction is evidenced by the fact that the first specific name given to the genus by Linnæus was *Nepenthes distillatoria*. The idea was equally prevalent that the liquid was provided to assuage the thirst of man, and possibly of other animals also. Thus Linnæus, in his "*Flora zeylanica*" (1747), quoting from Grimm, speaks of the pitcher as "*Digitis presso dissiliente aquam dulcem, limpidam, amabilem, confortantem, frigidam suppeditantia ad necessarium hominis usum, ita ut interdum sex vel octo receptacula tantum aquæ continent quantum unius hominis sitim cum maxima delectatione bene extinguere possit.*" So much, apparently, had this view impressed Breynne, that he named the plant after the *Nepenthes* of the Greeks, the assuager of sorrow; and Linnæus, in establishing Breynne's name, gave way to the following outburst of enthusiasm ("*Hort. Cliffort.,*" p. 431, 1737):—"Assumsi synonymon Breynii, cum enim si hæc non Helenæ nepenthes, certe Botanicis omnibus erit. Quis Botanicorum longissimo itinere profectus, si mirabilem hanc plantam reperiret, non admiratione raperetur, totus attonitus, præteritorum malorum oblitus, mirificam Creatoris manum dum obstupescens adspiceret?"

Here the matter was allowed to rest for a considerable time, little attention being paid to it until well on in the present century, when some notes on the liquid contents of the pitchers of two species were given in the "*Botanical Magazine,*" with

the descriptions and figures of the plants. In Vol. 53, 1826, No. 2,629, *N. phyllamphora* is described, with the following remarks:—"According to some authors the water rises from the roots, and is secreted into the vessels before the lid of the pitcher has ever been opened; and Rumphius observes that, in this state, these curiously constructed vessels contain the most water, the quantity of which diminishes after the lid opens, though even then it fills again in the course of the night and evaporates in the day; but after the lid is quite shrivelled the water entirely disappears. Loureiro, however, has a different opinion, and attributes the presence of the liquid to the reception and preservation of the night dews by the spontaneous opening and shutting of the lid. What is the real fact does not seem to have been as yet positively ascertained. In our plant, cultivated in the stove, the young pitchers, before the lid opened, were, Messrs. Loddiges observe, about one-third filled with a sourish tasted water; but after the lids opened, the water entirely evaporated." Again, in Vol. 55, 1828, No. 2,798, in the description of *N. distillatoria*, the matter is referred to:—"Before opening the lid, rather more than a drachm of limpid fluid was formed within each of the largest pitchers of our specimen. This had a sub-acid taste, which increased after the rising of the lid, when the fluid slowly evaporated. My friend, Dr. Turner, perceived it to emit, while boiling, an odour like baked apples, from containing a trace of vegetable matter, and he found it to yield minute crystals of superoxalate of potash on being evaporated to dryness."

Some years later an analysis of the liquid was made by Voelker (Ann. Mag. of Nat. Hist., ser. ii., vol. 4, 1849), who found that it gave a dry residue of about 0.9 per cent., consisting of chloride of potassium, carbonate of soda, and lime and magnesia in combination with malic and citric acids, together with a trace of organic matter; but this analysis does not appear to throw any light upon the physiological importance of the liquid. Nor do any investigations in this direction seem to have been made until the whole question of "carnivorous" plants had been raised by Darwin, when Sir Joseph Hooker made some experiments on the digestive power of the liquid in these pitchers. He found distinct evidence of digestive action on cubes of boiled egg, raw meat, blood-fibrin, and cartilage (Address, Brit. Asso-

ciation, 1874), though he somewhat qualifies his conclusion by the statement "That this process, which is comparable to digestion, is not wholly due to the fluid first secreted by the glands, appears to me most probable; for I find that very little action takes place in any of the substances placed in the fluid drawn from the pitchers and put in glass tubes." Within a short space of time a number of researches were made which seemed to place the digestive capacity of *Nepenthes* beyond doubt. Dr. Lawson Tait stated in "Nature" for 1875, that he had succeeded in obtaining a substance resembling pepsin from the liquid collected from the pitchers of various species of *Nepenthes*. In 1876, a Paper was published ("Ber. deut. chem. Ges.") by von Gorup-Besanez, in which he states that shreds of blood-fibrin placed in the acid liquid (from *N. phyllamphora* and *gracilis*) at a temperature of 40° C., were more or less completely dissolved within an hour, and that the resulting liquid gave the characteristic "biuret-reaction" indicative of the presence of peptones. In the following year I published a Paper on the subject in the "Journal of the Linnean Society" (Vol. xv., 1877), in which I showed that it is possible to prepare a glycerin-extract of the pitchers, which, on the addition of acid, has a well-marked digestive action on proteids.

Moreover, the structure of the internal surface of the pitcher, contrasting, as it does, strongly with that of *Sarracenia*, is such as to suggest a digestive function. In *Nepenthes*, speaking generally, honey-glands are borne on the under surface of the lid, or about the orifice of the pitcher; for a considerable, though varying, distance from the orifice, the surface is smooth and slippery; and the remainder of the surface is provided with glands which pour out the secretion: there is no region bearing detentive hairs as in *Sarracenia*. Clearly the object in view is to cause the insects to fall into the liquid filling the base of the pitcher; and the fact that the liquid is undoubtedly secreted points to the conclusion that its object is not merely to drown the insects, but to digest them as well.

Nevertheless, the digestive capacity of *Nepenthes* has been disputed of late years. Thus Dubois ("Comptes Rendus," cxi., 1890) concludes that "the liquid contains no digestive juice comparable to pepsin, and that *Nepenthes* is not a carnivorous plant"; and further "that the phenomena of disintegration or

false digestion observed by M. Hooker were, without doubt, due to the activity of micro-organisms introduced from without rather than to the secretion of the plant." Another writer in the same strain is Tischutkin ("Ber. d. deutsch. bot. Ges.," 1889; "Bot. Centralblatt," 50, 1892), who asserts that the solution of proteids in the liquid of insectivorous plants (incl. *Nepenthes*) is due to the activity of micro-organisms which are introduced, like the insects, from outside, and that these plants do not digest the insects, but only absorb the products of their putrefaction.

Had these two writers made themselves acquainted with all the previously ascertained facts, they would not, I venture to think, have thought it worth while to express these views. In order to fully reassure myself on the subject, I have made, during the last two years, a number of experiments with *Nepenthes* (chiefly *N. Mastersiana*), with special reference to the statements of Dubois and Tischutkin. I propose to publish a detailed paper on the subject before long, so I will now content myself with a brief summary of the chief results which I have obtained* :—

(1) I have confirmed my previous observation that a glycerin extract of the pitchers can be prepared (after thorough washing, and lying for 24 hours in absolute alcohol), which readily digests blood-fibrin, at a temperature of 35°–40° C., in presence of dilute HCl.

(2) I have repeatedly found that the liquid taken from an *unopened* pitcher digests blood-fibrin, under the above conditions, with great rapidity (1–2 hours).

(3) Liquid from open pitchers digests blood-fibrin very rapidly under the above conditions, the digestive action being much more rapid than any putrefactive change attributable to micro-organisms; further, the digestion goes on, though less rapidly, in the presence of antiseptics (*e.g.* thymol, chloroform, potassium cyanide).

(4) The liquid obtained from the pitchers, if filtered, may be kept in a bottle for a considerable time (months) without undergoing putrefaction, and it still retains its digestive power.

These results will, I trust, suffice to prove that the pitcher

* I am very much indebted to Messrs. Veitch for supplies of liquid from the pitchers, as also for valuable specimens of *Nepenthes* and other pitcher-plants.

of *Nepenthes* does actually produce a digestive enzyme, and that there is no ground for attributing the digestion of proteids which undoubtedly occurs in the pitchers, to the action of micro-organisms.

In concluding the consideration of *Nepenthes*, I must briefly allude to the mechanism of the secretion. In many cases, as is well known, the secretion of liquid by leaves is dependent upon the root-pressure, ceasing directly the leaf is detached from the plant. As Wunschmann first definitely proved ("Die Gattung *Nepenthes*," 1872), this is not the case in *Nepenthes*; the pitchers continue to secrete for some days after they have been detached, provided that the cut ends of their stalks are placed in water. In this respect the pitchers of *Nepenthes* resemble nectaries.

On account of the similarity of its pitchers to those of *Sarracenia* and *Nepenthes*, *Cephalotus* may be conveniently considered next. Unfortunately our knowledge in this case is far less complete than in the two preceding cases. In his paper on the Botany of Terra Australis, Robert Brown states that "the ascidia or pitchers of *Cephalotus* were observed to be in general nearly half filled with a watery fluid, in which great numbers of a small species of ant were frequently found drowned. This fluid, which had a slightly sweet taste, may possibly be in part a secretion of the pitcher itself, but more probably consists merely of rainwater received and preserved in it." However, there is now no doubt that the liquid is, at any rate for the most part, really secreted; for, as Goebel points out ("Pflanzenbiologische Schilderungen," II., p. 111), unopened pitchers contain liquid. As regards the structure of the internal surface of the pitcher, the under surface of the lid is smooth and slippery, as is also the inner surface of the thickened margin (or "collar") of the orifice; the surface of the middle portion of the pitcher bears numerous glands, which do not, however, appear to be digestive glands; and within this region there are two lateral projecting areas which not only bear glands, but numerous water-pores in addition; the lower part of the pitcher has no glands. What the glands secrete is not clearly ascertained, though it may be honey; probably the liquid in the pitcher is secreted through the water-pores. In view of these peculiarities of structure of the pitcher, there can

be no doubt that it is an apparatus for catching insects, resembling that of *Nepenthes* rather than that of *Sarracenia*.

With regard to the properties of the secreted liquid, the only evidence that it has any digestive power is a statement by Lawson Tait, made at the Glasgow meeting of the British Association, 1877 (quoted by Dickson in his paper on the Structure of the Pitcher of *Cephalotus*, "Journ. Bot.," vol. 27, new series, 1878), that the results of experiments performed by him with fluid taken from unopened pitchers, were such as to show that it exerted a digestive action upon animal substances similar to that exhibited by fluid from *Nepenthes* pitchers. Goebel, on the contrary, as the result of his own observations, takes the opposite view. He remarks, however, that the liquid seems to exert a distinct antiseptic action; so that whilst it is probable that the disintegration of the captured insects is effected by micro-organisms, it is a process, not of putrefaction as in *Sarracenia*, but of digestion, a conclusion which seems rather paradoxical.

The pitchers which we have considered so far are all such as may capture flying insects; though *Cephalotus*, owing to the fact that its pitchers are on the ground, captures more especially crawling insects. We come now to the consideration of those pitchers which do not capture flying insects, but only such small animals as either swim or crawl; this section includes *Utricularia* (with its immediate allies *Polypompholyx* and *Biovularia*) and *Genlisea*. The aquatic forms of *Utricularia* capture swimming insects, crustacea, &c.; and the land-forms, as also *Genlisea*, capture insects, &c., in the soil by means of their subterranean pitchers.

In speaking thus of *Utricularia*, I have anticipated somewhat; for I have adduced no evidence to show that the "bladders" of these plants really are insect-traps. It used to be thought that the pitchers of the aquatic forms served as floats to bring the plant to the surface at the time of flowering. Thus De Candolle ("Physiol. Végét.," II., 1832) says:—"When the plant is young, the bladders are filled with mucus which is heavier than water; hence the plant is kept at the bottom by this weight. When flowering approaches, the root secretes air which enters the bladders and expels the mucus, raising the valve of the bladder; then the plant, provided with a crowd of

air-bladders, slowly rises, and comes to float at the surface. Flowering takes place in the air; when it is over, the root recommences to secrete mucus which replaces the air in the bladders, so that the plant becomes heavier and sinks to the bottom, where it ripens its seed at the spot where they are to be sown."

Such a view is obviously incorrect for various reasons. In the first place it does not take into account the occurrence of bladders on the land-forms of *Utricularia*. Moreover the bladders of floating plants are by no means always filled with air; and Darwin has shown ("*Insectivorous Plants*," 1875, p. 404), that plants from which the bladders have been removed still continue to float. On the other hand, the observations of Darwin (*loc. cit.*), Cohn ("*Beitr. zur Biol. d. Pflanzen*," I., 1875), and others (see Goebel, "*Pflanzenbiologische Schilderungen*," II.), establish beyond doubt that these bladders are traps; when the animals have once entered, escape is rendered impossible by the closing of the valve guarding the orifice.

Since the plant produces such an elaborate mechanism for the capture of animals, the inference is obvious that some benefit must be gained thereby for the plant; the observations of Büsgen ("*Ber. deut. bot. Ges.*," 1888) prove, in fact, that plants thus supplied with animal food grow more vigorously than similar plants without it. The captured animals undergo disintegration in the bladders, and the organic products of the disintegration are absorbed by the plant, the process of absorption being effected by the quadrifid or bifid hairs which are scattered over the internal surface of the bladder. But it has not been ascertained whether the disintegration of the captured animals is effected by an enzyme secreted by the bladder, or is the result of putrefaction induced by Bacteria.

The pitchers of *Genlisea*, though they are adapted to catch subterranean animals, are altogether different in their form and mechanism from the bladders of *Utricularia* with which genus *Genlisea* is closely allied. The pitcher has somewhat the shape of a thermometer: the narrow orifice is continued, as it were, at each side into a canal formed by the long spirally wound appendages to which attention has been already drawn, and which penetrate into the soil. The orifice opens into a long narrow tubular neck the inner surface is covered by stiff

downwardly directed hairs arranged in a succession of rings, amongst which a number of stalked two-celled glands are scattered. The neck opens below into a small cavity, the internal surface of which is destitute of hairs, but which bears a number of scattered two-celled glands, as well as two rows of four-celled glands situated in two rows, one on each side, each corresponding with the longitudinal course of a vascular bundle with which the glands are in close relation. The arrangements here somewhat recall those in *Sarracenia*. The glands in the neck pour out a secretion which attracts minute animals to enter, and to creep further and further along it, the *chevaux de frise* of hairs preventing any return, until at length they reach the dilated glandular chamber at the extremity of the neck. What takes place there is not known; but whether the insects are digested or decomposed, the organic products are absorbed by the plant. Our knowledge of these pitchers is due to Darwin ("Insectivorous Plants") and to Goebel ("Pflanzenbiologische Schilderungen," II., 1891, p. 121; also "Biologie von Genlisea," Flora, 1893).

We come now to *Lathræa*, the last of our series of plants having subterranean pitchers. Attention was first directed to the peculiar cavities in the subterranean scale-leaves of this plant by J. E. Bowman ("Trans. Linn. Soc.," xvi., 1829). He detected the numerous glands which are borne on the surface of the labyrinthine cavity; and he suggested that, inasmuch as the scales have no stomata, these cavities might serve a respiratory function, opening as they do by an orifice just below the insertion of each scale. Shortly afterwards Meyen ("Phytotomie," 1830) distinguished the two kinds of glands—the sessile multicellular glands, the shortly stalked two-celled glands—and regarded the whole as an apparatus for the excretion of carbonate of lime. Various observers published observations on these structures during succeeding years without, however, making any striking suggestions as to their function, until Cohn, in 1877 ("Jahresb. d. Schl. Ges. für vaterl. Kultur") suggested that they might be traps to catch animals; but as he failed to find animal remains as a rule in the cavities, he relinquished this view in favour of another, that, namely, the glands secrete a liquid which renders it possible for the plant to absorb certain humus-constituents

of the soil, so that the plant would be at once a parasite and a saprophyte. Krause, in 1879, minutely investigated the histology of the scale-leaves, and expressed an opinion in favour of Meyen's conception of their function; whilst Gilbert, in 1880 ("Journ. Roy. Microscop. Soc."), suggested that the liquid secreted by the glands is acid; and further, that the glands not only secrete but absorb. Some years later a remarkable theory was propounded by Kerner and Wettstein ("Sitzber. d. k. Akad. d. Wiss. zu Wien," xciii., 1886; also Kerner, "Nat. Hist. of Plants," Vol. I., p. 136, 1894), to the effect that the cells of both kinds of glands do not secrete at all, but possess the power of extruding protoplasmic filaments through their walls, which catch animals and suck them dry. This, if true, would constitute an altogether new form of mechanism, among the higher plants, for the capture of animals; and *Lathræa* would be both parasitic and carnivorous. The point has since been re-investigated by Scherffel ("Mitth. aus dem Bot. Inst. zu Graz," II., 1888) with altogether different results. Scherffel finds, indeed, delicate filaments radiating from these gland-cells; but not from these only, for they were to be found at times on any of the cells lining the cavity; and not only so, but also on foreign bodies lying in the cavity. As the result of his observations, he comes to the conclusion that it is impossible for the gland-cells to protrude protoplasmic filaments; that the filaments observed are really nothing more than sessile filamentous Bacteria: and that these cavities cannot be regarded, from any point of view, as organs for the capture of insects. Quite recently it has been urged by Haberlandt ("Jahrb. f. wiss. Bot.," 1897), Goebel ("Flora" 1897), and Groom ("Annals of Botany," 1897), that the real function of these pitchers is to serve as organs for the excretion of water by the plant, correlated with the absence of stomata by means of which transpiration could be effected; a view for which there is much to be said.

Dischidia is the last of the plants which claim our consideration. The pitchers of this genus differ in many important respects from those of the other genera with which these are obviously comparable, viz., *Sarracenia*, *Nepenthes*, *Cephalotus*. In *Dischidia* (*D. Rafflesiana*) the pitcher has neither hood nor operculum; and, as Treub points out ("Ann. du Jard. Bot. de

Buitenzorg," III., 1882), whereas in most pitchers the internal surface corresponds to the superior or ventral surface of the leaf, in *Dischidia* (as also in *Lathræa*), the internal surface corresponds to the inferior or dorsal surface of the leaf. Moreover the pitcher presents none of those peculiarities of structure in its interior which make the pitchers of these other genera such efficient insect-traps; here are no glands, either digestive or secreting honey, nor any hairs to prevent the exit of animals which may have found their way into the pitchers; on the contrary, the internal surface of the pitcher is quite smooth, consisting of an epidermal layer of cells with highly cuticularised walls, among which are numerous stomata.

As to the contents of the pitchers, although Griffith says ("Trans. Linn. Soc.," xx., 1851), "they appear at no period to contain fluids," they have generally been found to contain water, as also small quantities of earth, fragments of leaves, &c., forming a rich soil. However, the contents of a pitcher will naturally depend upon its position; and as the pitchers of *Dischidia* take up all possible positions, so that the orifice may be directed upwards, or downwards, or horizontally, the foregoing statement obviously applies more particularly to pitchers hanging with the orifice upwards. But the most striking feature in the economy of this plant is the fact that each pitcher contains an adventitious root which springs generally from the stalk of the pitcher itself.

Now as to the function of these pitchers. On this point Wallich ("Pl. Asiat. Rar.," vol. 2, p. 142, 1831) says:—"I am unable to offer any conjecture as to the immediate use of these curious reservoirs, unless it be to protect the tender roots which are always found in them in great luxuriance; for after continuing a certain time, the bags acquire a yellowish hue and gradually decay, leaving the roots to attach themselves to the trunk of the tree on which the plant grows. . . . The bags contain generally a great number of small and harmless black ants, most of which find a watery grave in the turbid fluid which frequently half fills the cavity, and which seems to be entirely derived from without." Unger, on the other hand, considers that the liquid is secreted by the plant itself ("Anat. und Physiol.," 1855, pp. 214, 358); and Delpino suggests ("Nuovo Giorn. Bot. Ital.," iii., 1871; "Malpighia," iv., 1890) that these

pitchers, like those of *Sarracenia*, are traps for catching insects which, on decomposition, afford nutriment to the plant. There is, however, no sufficient ground for regarding the pitchers either as secretory organs or as insect-traps; on the contrary, the structure of the internal surface conclusively proves that the pitcher can neither secrete nor absorb, and that it is ill-adapted for the capture of insects. Treub points out ("Ann. du Jard. Bot. de Buitenzorg," III., 1882) that the liquid is certainly not secreted by the plant, but is merely rainwater, and concludes that the main object of the pitchers is to economise water in view of the dry habitat of these plants. The pendent pitchers, with the orifice upward, serve to collect rainwater, which can be absorbed by the roots entering each pitcher; the inverted pitchers cannot collect rainwater, but serve to condense the watery vapour given off by transpiration through the numerous stomata on their internal surface, and thus they render it available for re-absorption by the roots; the oblique or horizontal pitchers discharge one or both of these functions in varying degree according to their position. The detritus which collects in the pendent pitchers—apparently often carried thither by ants—no doubt affords nutritive material which is absorbed by the roots. These views have been confirmed by the recent observations of Groom and of Scott and Sargent ("Annals of Botany," vii., 1893). Hence these pitchers differ essentially in function from all those which we have considered, in that they are primarily organs for maintaining the water-supply of the plant.

In conclusion we may briefly review the main facts which have been ascertained. We find, in the first place, that the great majority of these pitchers are "insect-traps" (*Sarraceniaceæ*, *Nepenthes*, *Cephalotus*, *Utricularia*, *Genlisea*); whilst the others (*Lathræa*, *Dischidia*) have, apparently, no relation to the capture of animals. Of the "insect-traps," the majority appear to be incapable of digesting the animals which they capture (*Sarraceniaceæ*, *Utricularia*, *Genlisea*), absorbing merely the products of decomposition effected by micro-organisms; so that these plants are not really "carnivorous," but only saprophytic: on the other hand, the pitcher of *Nepenthes*, and perhaps that of *Cephalotus*, undoubtedly secretes a digestive enzyme, so that the former genus, at any rate, is truly "carnivorous." Those

pitchers which are not "insect-traps" are both related to the water-supply of the plant; in *Lathræa*, the main use of the pitcher seems to be to relieve the plant of the excess of water which it may have absorbed; whilst in *Dischidia*, on the contrary, the main use of the pitcher is to husband to the utmost the water-resources of the plant.

It is remarkable that the pitcher form should have been assumed by the leaves of so many different plants, some of which are systematically far removed from each other, and that the objects in view should be so widely different. Such considerations naturally suggest the difficult question as to the origin and evolution of the pitched leaf in the vegetable kingdom; a question to which, I will frankly admit, I cannot promise you a satisfactory answer. Beccari ("Malesia," vol. i., p. 236, 1878; vol. ii., p. 252, 1886) has urged, whilst especially discussing *Dischidia*, that pitchers are gall-formations, caused by the irritation set up by insects, which have become hereditary because the plant has found them useful for its own purpose; but this theory has not met with general acceptance. For my own part, I would venture to suggest that the origin of pitchers is to be traced back, not to the action of some extraneous cause, but rather to some special adaptation to meet the primary physiological needs of plants growing under certain special conditions. To take first the typical pitcher-bearing plants, such as the *Sarraceniaceæ*, *Nepenthes*, and *Cephalotus*: it is by no means probable that the pitchers of these plants were developed at once into insect-traps such as we know them to be; for this end has been even more successfully attained in quite other ways by such plants as *Drosera*, *Dionæa*, &c. On the contrary, it is probable that these pitchers had originally a different and a more primitive function. All these genera grow in damp situations: hence it is not an impossible conjecture that their pitchers may have been primarily developed as organs for the excretion of excessive water, like the pitched scale-leaves of *Lathræa*; but with this difference, that whereas in *Lathræa* the water is poured out into the soil, in these genera it was retained in the pitchers for subsequent re-absorption, when necessary, a special provision of importance in view of the fact that these plants are capable of active transpiration under appropriate external conditions. Insects, as a matter of course, came to be drowned in these

primitive pitchers, and the products of their decomposition began to be absorbed by the plant; thus the "insectivorous" habit, with its attendant modifications of structure and function, would be gradually established. With *Utricularia* and *Genlisea* the case is different. These are rootless plants, and consequently the absorptive functions of the root have been delegated to the leaves, or at least to some of them. It is not difficult to imagine how that in the land-forms of *Utricularia*, as in *Genlisea*, these vicarious "roots," being subterranean and absorbing water and substances dissolved in it, may have incidentally acquired the habit of catching animals; and, with regard to the water-forms of *Utricularia*, they have probably inherited this habit, with its accompanying peculiarities of structure, from ancestral terrestrial forms. Finally, I would regard the pitchers of *Lathræa* and of *Dischidia* as still primitive, meeting, as they do, primary physiological needs of the plant in connection with its water-supply, and not having undergone specialisation to meet the acquired need of organic nutriment obtained from captured animals.

But, as I said before, I have no intention of offering you anything like a cut-and-dried solution of the ultimate and most interesting problem to which the consideration of Pitcher-plants has naturally led us, so I will refrain from any further discussion of the suggestion which I have made. You will have gathered from what I have said that our knowledge of the physiology of Pitcher-plants is still far from complete; much yet remains to be done in the way of accumulating missing facts. But even when all the facts of their physiology have been accumulated, our knowledge will not be complete until we know, not only what they do, but also how they have come to be what they are.

STORING AND PRESERVING OF FRUIT.

By Mr. JOSEPH CHEAL, F.R.H.S.

[Read June 29, 1897.]

NEXT in importance to the growing of fruit is the preserving or storing it in order to prolong the period of use to the greatest possible extent. It is grievous to note in a year of plenty the vast quantities of fruit completely wasted for want of some simple

means of preserving it. I am here speaking entirely of amateurs ; large market growers are fully alive to the importance of preserving that fruit in the most profitable ways that cannot be sent to market fresh. The object of this paper, therefore, is to endeavour to assist those who grow fruit for their own consumption as to the best means of preserving and utilising it. Much of what is said will doubtless be well known to many, but some of the suggestions may be fresh and helpful to others.

SMALL FRUITS.

Currants, Gooseberries, Strawberries, Raspberries, and Cherries.

There is no means of greatly prolonging the keeping period in a fresh condition of these soft fruits, but as large quantities of them are required for cooking purposes throughout the year, they may be preserved by simply making into jam. This is such an old and well-understood process that I need scarcely touch upon it here. Probably nearly every housewife has a particular way of her own. One or two points, however, may be noted. It is most important to be careful in gathering the fruit so as to have only one variety and one quality to deal with at a time, except where two kinds of fruit are mixed together to improve the flavour, such as strawberries and red currants, raspberries and red currants, or strawberries and gooseberries. The briskness and acidity of the one helps the sweetness of the other.

Whole-fruit jam such as strawberries, raspberries, &c., is much more prized now than formerly. This is done by reducing the sugar to syrup first and pouring in the fruit while boiling, a little butter being added to keep the mass from rising and boiling over. Much small fruit is also made into jellies.

One of the most useful methods, however, of retaining in a more natural condition for use and without sugar is that of *bottling*. This is a most easy and simple process, far more so than was formerly the case, owing to a recent invention of bottles for the purpose, with ingenious contrivances for air-tight stopping.* Whatever kind of bottles you adopt they can be placed together in a shallow boiler or any vessel as deep as the height of the bottles, a little hay being placed between and under-

* See Advertisements, page 27.

neath them. The fruit, after being carefully picked and strigged, is then poured into the bottles until each is quite full. The boiler is then filled with water to the necks of the bottles and heated until the fruit shows signs of cracking, no water having been put into the bottles up to this period; or the bottles filled with fruit may be placed in a moderate oven and heated to the same point, without using water at all. The bottles are at this stage filled with *boiling* water and immediately covered whilst boiling with air-tight stoppers. This is most important, as all



FIG. 7.

fungoid germs must be destroyed to prevent fermentation. The old system of covering with skin was not only tedious but often failed to thoroughly exclude the air, with the result that mould soon made its appearance and further keeping was at an end. But with Messrs. De Luca, Hill & Co.'s bottles there is no danger of this. Corks are also sometimes used, but these require covering with resin or tin-foil, which to an amateur takes considerable time. In wholesale factories corks are still used, but in this case bottles are sold with the fruit, and this can be done at

a much cheaper rate with corks than with other patent stoppers. But with amateurs stoppered bottles can be used repeatedly and with care will last for many years. Gooseberries are generally bottled green, but black and red currants, raspberries and cherries when ripe.

Plums.

This is one of the most valuable crops for home consumption, and it is not possible greatly to extend the time for use in an entirely natural state, as the fruit is very tender and soon decays. This may, however, be done to a certain extent by cold storage where the establishment is large enough; and it is a most valuable help to gardeners in preserving not only plums but other choice fruit also, such as peaches, nectarines, apricots, figs, cherries, strawberries, melons, &c. Several experiments were carried out a few years since by the R.H.S. in this direction. It was then found that by placing the fruit in a temperature below freezing point the flavour and character of the fruit was too much altered, as it ruptured the cellular tissues, with the result that when thawed it almost immediately fell to pulp and decayed. But by keeping the temperature to within a few degrees of freezing-point much choice fruit could be kept in good palatable condition for periods of several weeks. This system is now very largely adopted by many of the shipping companies who convey fruit considerable distances in good condition in a low temperature, and the same system is adopted on the American railways to convey fruit long distances by land. I have seen cases of peaches brought by Messrs. Donald Currie & Co.'s steamers from the Cape to London containing from ten to twelve dozen fruits which did not contain half a dozen damaged fruits. In large establishments where quantities of fruit are grown, and when it is often difficult to keep fruit for special occasions, what an immense assistance it would be to the gardener to have a chamber of this kind in which to store surplus fruit until a time particularly required or to prolong the period of using an extra heavy crop. Any fruit intended to be stored in this way should be gathered before it is quite ripe.

The usual means of preserving plums are by jam and bottling, and a most useful dish they are when bottled as above described. For this purpose, however, they must be gathered before they

are quite ripe, otherwise the skin of many of the fruits is apt to crack in the heating process. Plums may also be preserved by bottling or canning in syrup. This is done by boiling together at the rate of three pounds of sugar to one quart of water and the white of one egg: pour the fruit whole into the syrup whilst boiling and continue to boil together for only a few minutes, then pour into bottles or cans and stopper or seal air-tight immediately whilst boiling. Or the fruit may be placed in the bottles or cans, the bottles heated and the syrup poured in just the same as in

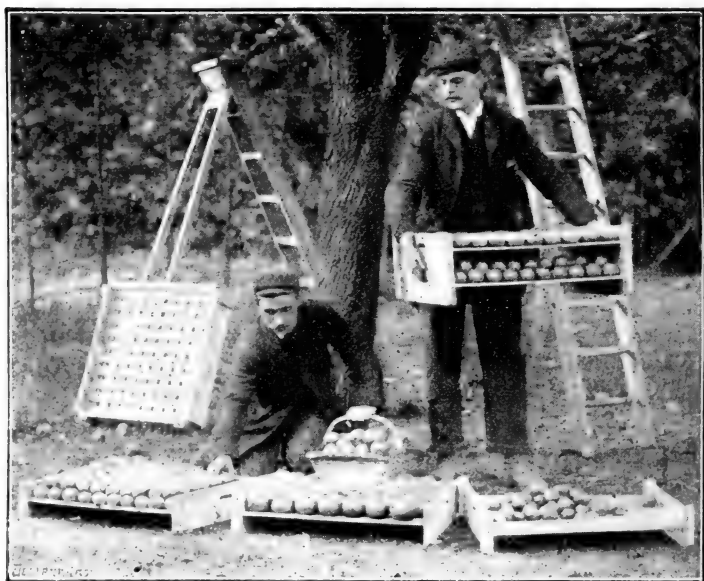


FIG. 8.

bottling with water and stoppered whilst boiling hot. Any of the small fruits may also be preserved in this way, as well as peaches, nectarines, and pears.

We now come to a less known method of preserving plums, that of evaporation. Although sun-drying and evaporation have been practised for years in France and America, it has not yet gone beyond the experimental stage in this country. The experiments point pretty conclusively, however, to the extensive adoption of this method in future. It needs but a very simple

contrivance to evaporate a quantity of plums for home consumption. I have found a paraffin or gas stove with an oven answer the purpose excellently. Mr. Philip Crowley, chairman of the Fruit Committee of the R.H.S., has also found that he can dry plums in his kitchen oven by placing them on trays after the cooking for the day is over and the heat is gradually subsiding. They are left in all night, and the process repeated for three

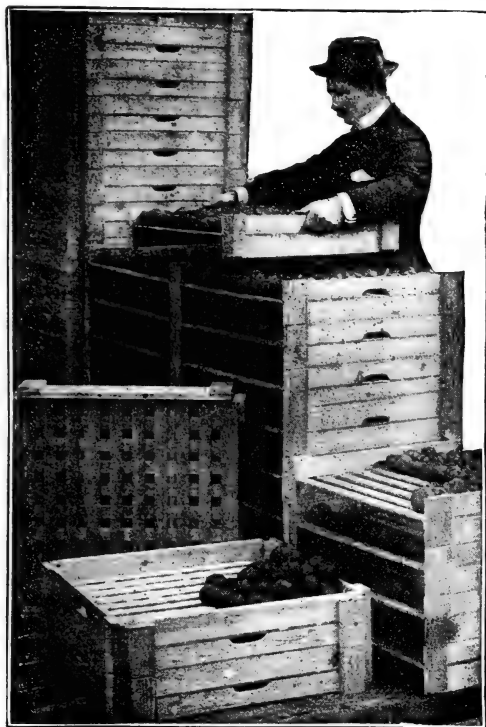


FIG. 9.

nights in succession. This gives exactly the same process as that adopted in prune drying in France, plums being much better when dried and allowed to cool two or three times than when done at one operation. Some of the plums dried by Mr. Crowley in this way when soaked in water and cooked were fully equal to French prunes. It is not, however, all varieties of plums that are suitable for this process. Tender-skinned varieties

such as Victoria do not dry well, but varieties such as Prince Englebert, Black Diamond, Monarch, Czar, Kirke's, Emperor, &c., are excellent for the purpose.

Apples.

This is a fruit that is so much needed in every household that the best means of keeping up a good supply is of the utmost importance. What are the conditions required to keep apples, and how these conditions may be provided, I will now try to explain. The first condition is that they should be inaccessible to frost, except it be occasionally two or three degrees. Secondly, the temperature should be maintained as equable as possible, and not exposed to any sudden rise or fall. Thirdly, they should not be too dry. Fourthly, some means of ventilation should be provided when required.

The easiest and cheapest mode of accommodation must, of course, depend upon the resources that each grower has at hand; but the needful conditions are more easily and cheaply provided than many imagine. A cave in a chalk bank or sandhill makes an admirable apple store, where all the requirements are present except fitting up the needful shelves and means for ventilating. Where this is impracticable, it is sometimes the case that a barn or other farm building may be easily converted into a suitable store by the construction of an inside lining of match-boarding, the intermediate space being filled up with sawdust, straw, or sedge hay. Where, however, none of these means exist, a simple store may be made as follows:—Select a shady, sheltered position and excavate the soil to a depth of 2 to 3 feet, according to the nature of the soil and means of thorough drainage. Set out the building to a width of 10 feet and length according to requirements, build a plain wall to a height of about 3 feet. above ground, cover with a thick coat of thatch, and line the rafters with match-boarding. Bank up the outside of the walls with soil and let the thatch project well over it. This will keep out frost and maintain an even temperature. Then form shelves 3 feet wide on each side and about 15 in. apart. A double window with a shutter should be placed at one end and a double door at the other, and a ventilator in the gable at each end. A building thus constructed, 20 feet long and 10 feet wide, would store about 100 bushels of fruit. Leave the earthen floor, which

ensures sufficient moisture to keep the fruit plump. The apples may be placed in layers four or five fruits thick.

In gathering fruit for the store room, it is important that it be left on the tree until it is fully matured. It is better to lose some by wind rather than to damage the whole by gathering too soon, the result of this being that the fruit will not only shrivel but be devoid of its full saccharine flavour. Be careful in placing the fruit in the room that it is thoroughly dry and free from damaged or diseased fruits, and when once placed on the shelves disturb the fruit as little as possible. For the first two or three weeks after placing in the store give abundance of ventilation, until all the fruit has ceased to perspire. It may then for the remainder of the season be kept very close, only occasionally allowing slight ventilation if there are signs of superfluous moisture. Also close the shutter to maintain continual darkness.

For choice dessert varieties in the fruit-room, the movable trays (*see* figs. 7-9),* will be found most useful in place of fixed shelves. They permit of the fruit being easily examined at any time without disturbing by hand, and they are also very economical of space.

Some of the varieties most suitable for storing are Wellington, Norfolk Beefing, Claygate Pearmain, Winter Pearmain, or Duck's Bill, Mannington's, Sturmer, Alfriston, Ross Nonpareil, Prince Albert, Bismarck, and Newton Wonder.

After the store has once been used, be very careful before filling again to thoroughly cleanse every crevice. Also fumigate it thoroughly by burning sulphur in it when closed up. This fumigating, if properly done, will destroy all insects and larvæ as well as fungoid germs. A coating of lime wash will help to sweeten the store.

Evaporation has been tried on a considerable scale for apples, and a plentiful crop will well pay for the process. The fruit is pared, cored, and cut into rings by some simple machine, and then placed on wire trays constructed for the purpose, of which there are now a number of patents, or a simple oven may be constructed for the purpose, in which shelves are placed one above the other, and a brisk heat maintained until all the moisture is extracted. It is important that a circulation of air be maintained during the evaporation or else the fruit will cook

* See Advertisements, p. 18.

and then dry, and will become quite a different product to properly evaporated fruit. The latter is thus described by an eminent American chemist:—"The diastase or saccharine ferment contained in all fruit, and which is the primary cause of its decay, has been rendered inoperative and all germs of animal or vegetable life have been destroyed by the high heat. It is by this chemical change which I have briefly described, in uniting a part of the water already contained in the fruit with the fruit starch, that these truly evaporated products are rendered more wholesome, digestible, and indestructible, and are thereby made more valuable, not only as articles of food, but because they are not subject to deterioration or loss."

The apple rings should be placed in the evaporator immediately after being cut, unless, as is customary when drying on a large scale, they are first submitted to the fumes of sulphur, a process called bleaching. This preserves the colour without damaging the fruit, but it is not needed if the fruit is placed in the evaporator before it has had time to become discoloured. Apples, contrary to plums, are best when dried at one time and occupy from $2\frac{1}{2}$ to 5 hours, according to the variety.

The making of cider by small growers has very largely declined, although attempts are being made to revive it, but apple juice is used in jelly-making and also for various syrups, and in seasons when other fruit is scarce a very palatable jam can be made by a mixture of apples and blackberries.

Pears.

These require quite different treatment from apples, inasmuch as they would, if placed in the low moist temperature suited to apples, lose their flavour entirely. Therefore they require a much drier building, and if possible one where the temperature can be artificially raised by hot-water pipes or other means. Pears must not be laid so thickly on the shelves as apples. With a suitable store and a good selection of varieties, many useful dessert pears may be kept until February and March. Stewing pears may also be kept until May and June. Pears may also be easily preserved in syrup as in France and Italy. For this they are selected before being too ripe, and are pared and quartered or halved according to size; boil the syrup and

bottle as directed for plums, &c. They may be either left the natural colour or tinted with cochineal.

The candying of fruit is an industry largely practised in France, but has scarcely been attempted in this country. It requires considerable patience and much nicety to produce the tasty article sent to our markets from France. The process is rather tedious, as the fruit requires repeatedly dipping in the prepared syrup. But there is no reason why the art should not be practised when once acquired by our women and girls.

In seasons of scarcity of fruit a wholesome jam may be made from vegetable marrows. These should be used fairly young, cut into squares and boiled with equal weight of sugar and flavoured strongly with root-ginger. This makes a very agreeable preserve to some people.

Green tomatos may also be used in a similar way and flavoured either with ginger or lemon. Excellent jellies are also made of Siberian and other crabs, and of the common barberry.

DISCUSSION.

The Rev. W. WILKS said that he had experimented somewhat largely with bottling fruit, and although he differed from Mr. Cheal in a few points, yet he could most confidently recommend the system of lock-vacuum self-closing bottles invented by Messrs. De Luca, of 6 Long Lane, Aldersgate Street. With these bottles all fruits could be bottled with the greatest possible ease, and would keep perfectly fresh and good for apparently an unlimited time. Mr. Wilks differed from Mr. Cheal as to putting boiling water. He said: The way I proceed is as follows: I take one of these bottles of Mr. De Luca's and fill it full of fruit and shake it down well several times; I then put on the caps lightly, and place the filled bottles in a boiler filled with cold water up to the lower part of the necks of the bottles. The boiler is put on the fire, and as soon as it boils it is allowed to continue boiling from ten to twenty minutes, when it is taken off the fire, the cap given a slight screw down, and the bottles left in the hot water to cool. This is all. It will be noticed that I put no water whatever *inside* the bottles with the fruit. It is perfectly true that by my plan the fruit does, to some extent, get a little mashed, but it preserves the whole of the flavour

much better, and, after all, the fruit is going to be made into pies in winter and spring, so that the preserving its shape is of no great importance—at least in my opinion. If, however, it is desired to keep the fruits all whole and of good shape, when the bottles are filled with fruit they should be filled up about two-thirds with cold water, or with a thin cold syrup, before they are put in the boiler, and this will prevent the fruits mashing at all.

EXAMINATION IN HORTICULTURE.

APRIL 6, 1897.

EXAMINERS' REPORT.

To the President and Council of the Royal Horticultural Society.

Gentlemen,—We beg leave to report that we have examined the papers submitted to us—in all 181.

Of these we selected 87 as worthy to be placed in the first class, 54 in the second, and 28 in the third. The remainder, 12, are not placed; the number of marks attained being below 100.

The distribution of the examinees were 169 in England, 6 in Scotland, 1 in Ireland, 1 in Wales.

The present Examination shows a very considerable improvement upon the results of that held in 1896. This will be apparent from the following comparison of percentages:—

Those not classed are only 12 in number, or nearly one-third of that last year (34).

The percentage of the third class (100 to 149 marks) has fallen from 32·2 (1896) to 15·2 (1897).

The percentage of the second class (150 to 199 marks) is nearly stationary; viz., 34·8 (1896); 29·8 (1897).

The percentage of the first class (200 to 300 marks) has made the astonishing increase from 10·5 (1896) to 48·3 (1897).

These results are most encouraging. Speaking generally, the answers are extremely well done. The information is

accurate upon the whole, and the subject matter well expressed. Perhaps the "Practical Horticulture" showed, as might be anticipated, a slight superiority over the "Elementary Principles."

GEORGE HENSLOW.

JAS. DOUGLAS.

The names and addresses of the successful candidates, together with the marks assigned to each, are given in the following Class List, to which is appended the questions set by the Examiners :—

CLASS LIST.

Maximum number of marks obtainable, 300.

First Class.

	No. of Marks gained.
*1. Mr. H. S. Langford, Horticultural College, Swanley .	300
2. Miss F. M. Broade, Horticultural College, Swanley .	288
2. Mr. J. H. Dick, 8 Victoria Place, Trinity, Edinburgh	288
2. Mr. F. Isted, Technical Laboratory, Chelmsford .	288
2. Miss G. Webb, Horticultural College, Swanley .	288
6. Miss E. Barratt, Technical Laboratory, Chelmsford .	286
7. Mr. A. J. Cocke, Horticultural College, Swanley .	284
8. Miss O. Field, Horticultural College, Swanley .	282
8. Mr. J. I. Goodlet, Horticultural College, Swanley .	282
8. Mr. H. J. Hickin, Tamworth	282
11. Mr. H. Reynolds, The Laurels, Hayle, Cornwall .	279
11. Mr. J. Stone, Board School, Tamworth	279
11. Miss F. E. Worland, Horticultural College, Swanley .	279
14. Mr. A. D. Hogg, Botanical Gardens, Edinburgh .	276
15. Mr. F. H. Harris, Technical Laboratory, Chelmsford .	270
15. Mr. W. Pilcher, Horticultural College, Swanley .	270
15. Miss B. S. Watson, Horticultural College, Swanley .	270
18. Mr. H. G. Rogers, Rettenden, Edmonton	267
19. Mr. C. J. Langley, Technical Laboratory, Chelmsford .	264
19. Mr. E. Miller, Technical Laboratory, Chelmsford .	264
19. Miss A. Morison, Horticultural College, Swanley .	264
22. Mr. E. J. Allard, Botanical Gardens, Cambridge .	258
22. Miss E. Hodsoll, Horticultural College, Swanley .	258
22. Mr. G. W. Young, Technical Laboratory, Chelmsford .	258

* Wins the Society's Silver Gilt Medal and Chiswick Scholarship.

25. Mr. A. W. Day, Horticultural School, Holmes Chapel, Cheshire	255
26. Mr. F. Mason, Whalebon Road, Chadwell Heath, Essex	252
26. Miss G. B. Robertson, Horticultural College, Swanley .	252
28. Miss B. Allman, Horticultural School, Holmes Chapel, Cheshire	250
29. Mr. A. D. Berney, Horticultural College, Swanley .	246
29. Mr. C. H. Hooper, Horticultural College, Swanley .	246
29. Mr. F. M. Newton, Technical Laboratory, Chelmsford	246
29. Mr. A. W. Snipe, Tamworth	246
29. Mr. E. H. Wilson, Kew	246
34. Mr. W. Hales, 16 Gloucester Road, Kew	243
35. Mr. W. J. Flower, Horticultural College, Swanley .	240
35. Mr. J. H. Jones, Board School, Tamworth	240
35. Miss F. Petty, Horticultural College, Swanley	240
35. Miss F. Potter, Horticultural College, Swanley	240
35. Mr. H. Stapley, Rose Cottage, Gatten Park Road, Redhill	240
35. Mr. G. C. Watson, 626 High Road, Tottenham	240
35. Miss E. J. Welsford, Horticultural College, Swanley .	240
42. Mr. M. Paton, Stewarton, Ayrshire	237
43. Mr. W. R. Reader, Osmaston Manor, Derby	237
43. Mr. E. Smith, Montford, Brierfield, Burnley	237
45. Mr. C. Leeson, Wrawby, Brigg	235
45. Mr. G. Underwood, 23 Free School Lane, Leicester .	235
47. Mr. A. Edwards, 47 Russell Street, Cambridge	234
47. Mr. H. Martin, Technical Laboratory, Chelmsford	234
47. Miss J. Newsham, Horticultural College, Swanley	234
47. Miss E. Vaughan, Technical Laboratory, Chelmsford .	234
51. Mr. A. J. Dover, Eccleshall, Staffordshire	232
51. Mr. D. Rutherford, Tutbury, Burton-on-Trent	232
53. Mr. A. E. Burgess, Technical Laboratory, Chelmsford	228
53. Mr. O. D. Carter, Technical Laboratory, Chelmsford .	228
53. Mr. F. A. Dance, Technical Laboratory, Chelmsford .	228
53. Mr. H. F. Easton, Puller Road, High Barnet, Herts. .	228
53. Mr. W. H. Elbourn, 74 Russell Street, Cambridge	228
53. Mr. W. Lord, Milburn Gardens, Esher, Surrey	228
53. Miss M. White, Technical Laboratory, Chelmsford	228
60. Mr. J. Banting, Pontyclun, Llantrisant, Monmouth	227
60. Mr. W. J. Bell, Upper Tean, Stoke-on-Trent	227

	No. of Marks gained.
62. Mr. F. Holt, Park View Nursery, Accrington	225
62. Mr. W. Robinson, Hawk's House, Brierfield, Burnley	225
64. Mr. C. Bishop, Board School, Tamworth	222
64. Mr. N. Collard, Horticultural College, Swanley	222
66. Mr. W. H. White, 3 Avenue Extension, Clarendon Park, Leicester	220
67. Mr. J. H. Annear, Technical Laboratory, Chelmsford	219
68. Mr. E. D. Smith, Technical School, Gravesend	217
69. Miss F. Andrews, Technical School, Gravesend	215
70. Mr. E. J. Callender, Horticultural College, Swanley	213
70. Mr. E. C. Kenny, Horticultural College, Swanley	213
72. Mr. S. G. Wilcock, Boroughbridge, York	212
73. Mr. F. K. Derbyshire, Horticultural School, Holmes Chapel, Cheshire	210
73. Mr. C. Gosling, Goring-on-Thames	210
73. Mr. W. Hunter, Great Ayton	210
73. Mr. B. G. Nettleton, Technical Laboratory, Chelmsford	210
77. Mr. H. Brook, 171 Every Street, Nelson	207
78. Mr. R. Bellerby, Askham Grange Gardens, Askham- Richard	205
78. Mr. R. Francis, Rockdale, Sevenoaks	205
78. Mr. J. Read, Horticultural School, Holmes Chapel, Cheshire	205
78. Mr. H. Ward, Vine Cottage, Charing, Kent	205
82. Mr. H. W. Jackson, 60 Russell Street, Cambridge	204
82. Mr. A. C. Pickford, Horticultural College, Swanley	204
84. Mr. H. Baker, Castle Ashby, Northampton	200
84. Mr. D. R. Hicks, Sandon, Stone, Staffordshire	200
84. Mr. J. Laws, 3 Walnut Tree Place, Wimbledon	200
84. Mr. J. Slack, Horticultural School, Holmes Chapel, Cheshire	200

Second Class.

1. Mr. W. Sproston, Great Haywood, Staffordshire	198
2. Mr. E. W. Ashley, Botolph Claydon Board School, Winslow	197
2. Mr. W. H. Kidwell, Colwich, Staffordshire	197
4. Mr. G. W. Hunt, South Knighton Road, Leicester	195
5. Mr. F. A. Gwilliam, Palace Gardens, Gloucester	192
5. Mr. G. B. Pratt, Technical Laboratory, Chelmsford	192

	No. of Marks gained
7. Mr. C. H. Burden, Horticultural College, Swanley	189
7. Mr. A. Fairfield, Glascote Heath, Tamworth	189
7. Mr. J. W. Thompson, Holywath Cottage, Coniston	189
10. Mr. W. Cranfield, 3 Coronation Street, Cambridge	186
10. Miss C. M. Hull, Technical Laboratory, Chelmsford	186
12. Mr. D. P. Bass, Bednall, Staffordshire	185
12. Mr. J. J. Cooper, School House, Walsall	185
12. Mr. J. Jeffery, Moor Court Gardens, Oakamoor, Stoke-on-Trent	185
12. Miss M. Mackenzie, Horticultural School, Holmes Chapel, Cheshire	185
12. Mr. A. W. A. Shaw, Great Ayton, R.S.O.	185
12. Mr. G. Wicking, Clarendon Park, Leicester	185
18. Mr. U. Warren, 20 Woodville Terrace, Darwen	182
19. Miss B. Hay, Horticultural College, Swanley	180
19. Mr. J. W. Heweson, Great Ayton	180
19. Mr. J. Hardy, Horticultural School, Holmes Chapel, Cheshire	180
19. Miss E. Watts, Horticultural College, Swanley	180
19. Mr. J. Wilkinson, 73 Devonshire Street, Accrington	180
24. Mr. W. Ingram, Board School, Kettlebrook Road, Tamworth	177
24. Mr. J. Thompson, Horticultural College, Swanley	177
26. Mr. W. Bowyer, 22 Rowland Grove, Wells Road, Sydenham, S.E.	175
26. Mr. A. Cutter, High Street, Cheshunt, Herts	175
26. Mr. E. Semper, Scawby Hall, Lincoln	175
26. Mr. A. Taylor, Great Ayton	175
30. Mr. W. G. Hatch, 2 Windsor Road, Southend-on-Sea	174
30. Mr. W. J. Reed, Technical Laboratory, Chelmsford	174
30. Mr. W. Kenny, Horticultural College, Swanley	174
33. Mr. E. Timson, Leicester Frith, Leicester	168
34. Mr. A. Bennett, Technical Laboratory, Chelmsford	167
35. Mr. W. Jennings, Horticultural School, Holmes Chapel, Cheshire	166
36. Mr. S. Laskey, Castle Hill Gardens, Egham	165
36. Mr. R. Lyon, Greenhall, High Blantyre	165
36. Mr. A. D. Morris, Barrowmore Hall, Chester	165
36. Mr. A. Shaw, Broad Royal Head, Staincross, Barnsley	165
36. Mr. H. Spooner, Technical Laboratory, Chelmsford	165

41. Mr. J. Benson, Technical Institute, Aughton . . .	160
41. Mr. W. Burgess, Bredon Norton, Tewkesbury . . .	160
41. Mr. W. Bygrave, Barkway, Royston, Herts . . .	160
41. Mr. Jos. Poulter, Clayton le Moors, Accrington . . .	160
45. Mr. F. Lazenby, Botanic Gardens, Cambridge . . .	159
46. Mr. S. Barritt, Technical Laboratory, Chelmsford . . .	156
46. Mr. J. Kent, Tamworth	156
46. Mr. S. S. Mundy, Tamworth	156
49. Mr. J. Barkham, Longford House Gardens, Haven Street, Ryde	150
49. Mr. L. Farmer, Horticultural College, Swanley . . .	150
49. Mr. W. Godsmark, Great Ayton	150
49. Mr. G. Hallam, Wellingore, Lincoln	150
49. Mr. E. F. Jeffrey, Horticultural College, Swanley . . .	150
49. Mr. H. E. Wainright, Tamworth	150

Third Class.

1. Mr. H. Owen Weddell, Surbiton	145
2. Mr. H. Crawley, Grange Lodge, Kippington, Sevenoaks	140
2. Mr. C. Cundy, Sudbury, Suffolk	140
2. Mr. A. Osborn, Sonning	140
2. Mr. W. Goddard, The Lodge, Knighton Hall, Leicester	140
6. Mr. L. Hales, Horticultural College, Swanley . . .	138
7. Mr. G. Gay, Doncaster	135
7. Mr. J. Prescott, Technical Institute, Aughton . . .	135
9. Mr. R. Hudson, Swaffam, Norfolk	130
9. Mr. R. Jones, Technical Institute, Aughton . . .	130
9. Mr. G. M. Stuart, Eden, Banff	130
12. Mr. M. Gravestone, Harris Institute, Preston . . .	125
12. Mr. G. J. Goodall, Streathy, Oxon	125
12. Mr. J. Chas. Tate, Bulmer, Welburn, Yorks . . .	125
15. Mr. H. Broadbent, Park Hall, Evesham	120
15. Mr. W. Grantham, Technical Institute, Aughton . . .	120
15. Mr. J. H. Jones, Horticultural School, Holmes Chapel, Cheshire	120
15. Mr. Thos. Windle, 9 Turnford Villas, Turnford . . .	120
19. Mr. C. Rhymes, 28 Cottage Grove, Surbiton . . .	117
20. Mr. Th. Cheesman, Fairmile Hatch, Cobham . . .	115

	No. of Marks gained.
20. Mr. R. Crichton, Sutton House, Baldoyle, Dublin .	115
22. Mr. E. R. Christiansen, Cheshunt Street, Cheshunt .	110
22. Mr. W. Hind, Technical Institute, Aughton . .	110
22. Mr. O. H. Burley, Milburn Gardens, Esher . .	110
25. Mr. G. W. Brookbank, Wimbledon	108
25. Mr. G. C. Farrant, The Cottage, Stoke D'Abernon, Cobham	105
25. Mr. C. J. Illsley, The Tilt, Cobham	105
28. Mr. T. H. Smith, The Tilt, Cobham	100

ROYAL HORTICULTURAL SOCIETY'S EXAMINATION IN HORTICULTURE.

APRIL 6, 1897.

QUESTIONS.

Eight questions only to be answered ; four from Division A and four from Division B.

DIVISION A.

ELEMENTARY PRINCIPLES.

1. What are the three chief mineral ingredients of a soil? Name garden plants or shrubs which delight in each kind respectively.
2. What differences may be expected from growing unripe, perfectly ripe, and long-kept seeds respectively?
3. In transplanting, why is it necessary to preserve the extreme and most delicate tips of the root-fibrils?
4. Why does covering Rhubarb redden and lengthen the leaf-stalks and stop the growth of the blade?
5. Describe the structure of a hyacinth bulb, and explain why the Dutch method of slashing or hollowing out the bottom induces the formation of bulbils?
6. What are the essential conditions for successful grafting?
7. How does the structure of a plum differ from that of an apple? Explain the origin of each.
8. Name the Natural Orders or Families to which the following plants belong:—Cyclamen, Rhododendron, Clematis, Stock, Pelargonium, Borage, Potato, Onion, Parsley and Turnip.

DIVISION B.

HORTICULTURAL PRACTICE.

9. Explain the process of cross-fertilisation in garden flowers, and give examples of both hardy and exotic plants that have been improved thereby.

10. After seed of the Chinese Primula has been ripened describe the method of sowing and subsequent treatment of the plants up to the period of their flowering.

11. What is the native country of the celery plant, and under what conditions does it grow naturally? Give a short account of its culture, such as time of sowing and subsequent treatment.

12. When and under what conditions is Sea Kale found in a wild state? Describe its culture and state the time of the year it is in use.

13. Where is the common Asparagus said to be found in a wild state? State all you know of its culture, and for how long a period it may be had in use.

14. Give an account of the Apple. How are the trees propagated? State what you know of its culture, and the diseases to which the trees are liable, and the remedies. Name one good cooking variety for use in each month from August to April inclusive.

15. State all you know about the Raspberry. What sort of soil is best adapted to its culture? Give method of training and pruning, and the best varieties to cultivate, both yellow and red.

16. Give an account of the usual method of Gooseberry culture adopted in gardens; and also the Lancashire method to obtain prize fruit. Name six of the best prize varieties and six best for ordinary garden culture.

TRIAL OF CABBAGES FOR SPRING USE AT CHISWICK, 1896-7.

A collection of forty-five stocks of cabbages were sown on August 7, 1896, with a view of testing their earliness for spring use, hardiness, and freedom from running to seed. The collection was planted out, immediately the plants were large enough, on a south border, and probably owing to the late date of sowing there was a remarkable absence of running to seed in all the varieties. All the varieties in condition were examined by the Fruit and Vegetable Committee on June 15, 1897.

A.M.=Award of Merit.

1. Best of All (Barr).—Stem short; heads firm, conical, and of large size, with small compact outer leaves. Ready for use June 1.

2. Blackwell Early (Kent & Brydon).—Stem short; heads firm, roundish, of medium size, heavy, with spreading outer leaves. Ready for use May 20.

3. Cattell's Reliance (Nutting).—Stem short; heads firm,

conical, medium size, with small outer leaves. A handsome variety. Ready for use June 2.

4. Cavalier (Dobbie).—A large coarse kale.

5. Chou de Burghley (Barr).—Stem rather long; heads fairly firm, long and conical, with upright outer leaves. Late and uncertain in forming heads.

6. Chou de Milan (Vilmorin).—A savoy.

7. Chou Gouffre d'Hiver (Vilmorin).—Late, of no value for spring use.

8 & 9. Couve Tronchuda (Barr & R. Veitch).—Only useful for winter use; no value for spring.

10. Chou de Brunswick (Vilmorin).—Late, of no value for spring use.

11. Christmas Drumhead (Barr).—**A.M.** December 12, 1893. Only valuable for autumn and winter use.

12. Dwarf Autumn Cutting (Barr).—Stem short; heads firm, conical, and small, with a large spread of outer leaves. Ready for use June 4.

13 & 14. Early Dwarf York (Barr & J. Veitch).—Stem moderately long; heads firm, conical, and of medium size, with a large spread of outer leaves. Ready for use June 12.

15. Early Small White Erfurt (Benary).—A spreading flat variety of no use for spring cutting.

16. Early Offenham (J. Veitch).—Stem short; heads firm, large, and conical, with a small spread of outer leaves. Very compact. Ready for use May 26.

17. Earliest of All (R. Veitch).—**A.M.** June 15, 1897. Stem short; heads firm, conical, of medium size, with a very small spread of outer leaves; standing well without bursting. Ready for use May 15.

18 & 19. Ellam's Early Dwarf (J. Veitch & Nutting).—**A.M.** April 8, 1884. Stem short; heads firm, conical, medium size, with a small spread of outer leaves. Ready for use June 12.

20. Fidler or Pomeranium Pointed Head (Benary).—Tall, spreading. No value as a spring variety.

21. First and Best (Hurst).—Stem short; heads conical, of moderate size, with a small spread of outer leaves. Ready for use May 19.

22. Hardy Green Colewort (J. Veitch).—Excellent as a colewort, but of no value as a cabbage.

23. Henderson's Succession (Henderson).—Late ; with large spreading leaves. Only useful for autumn cutting.

24 & 25. Improved Nonpareil (J. Veitch & Nutting).—Stem short ; heads firm, conical, of medium size, with a small spread of outer leaves. Ready for use June 1.

26. Large White Solid Magdeburg (Benary).—No use as a spring variety.

27. Largest White Schweinfurt (Benary).—No use as a spring variety.

28. Large White Brunswick (Benary).—No use as a spring variety.

29. Large York (Barr).—See No. 2.

30. Large Early Conical (Benary).—Late ; tall, spreading. No use as a spring variety.

31. Little Gem (Sutton).—**A.M.** September 10, 1895. Stem short ; heads firm, small, and conical, with small spreading outer leaves. Ready for use June 15.

32. Leeds Market (Nutting).—**A.M.** September 10, 1895. Stem short ; heads firm, conical, and large, with a moderate spread of outer leaves. Ready for use June 19.

33. Magdeburg (Dobbie).—See No. 26.

34. Matchless (J. Veitch).—Stem short ; heads firm, slightly conical, of medium size, with a very small spread of outer leaves. Ready for use June 12.

35. Robert Wrench (Wrench).—Stem short ; heads firm, bluntly conical, and of large size, with a wide spread of outer leaves. Ready for use May 23.

36. Rossette Colewort (J. Veitch).—A fine early colewort. Of no value as a cabbage.

37. St. John's Day (J. Veitch).—**A.M.** September 10, 1895. Stem short ; heads sharply conical, of medium size, with rather spreading outer leaves. Ready for use June 4.

38. St. John's Day Earliest Flat (Benary).—Stem short ; heads round, flat, and loose. Not much value for spring use. Ready for use June 12.

39. Sutton's Earliest (Sutton).—**A.M.** June 15, 1897. Stem short ; heads firm, conical, medium size, with small outer leaves. A handsome variety standing well without bursting. Ready for use May 15.

40. Sugar Loaf (Barr).—A dark green form of No. 2. Ready for use June 15.

41. Superfine Early Dwarf York (Barr).—**A.M.** September 10, 1895. A greatly improved dark green form of Nos. 13 and 14. Ready for use June 12.

42. The John o' Groats (Holmes).—Stem short; heads firm, conical, medium size, with very small outer leaves. A handsome variety. Ready for use June 2.

43. Ulm Quintæl Large White (Benary).—Tall and late. No use as a spring variety.

44. Winningstadt (J. Veitch).—**A.M.** September 10, 1895. Very large and late. Of no use as a spring variety.

45. Winningstadt Sugar Loaf (Benary).—An inferior form of No. 44.

REPORT ON BROAD BEANS AT CHISWICK, 1897.

Six stocks of Broad Beans were received for trial in 1896, but, proving a failure in that year, they were again tried in 1897. The seeds were sown March 25 on ground deeply trenched and well manured. All the stocks made good growth, and were examined by the Fruit and Vegetable Committee on July 1.

A.M. = Award of Merit.

× × × = Highly Commended.

1. Champion (Dobbie & Co.).—**A.M.** July 1, 1897. Pods light green, and freely produced, averaging six beans in long and very straight pods; very heavy crop; height 2 feet. Ready for use June 28.

2. Exhibition Long Pod (R. Veitch).—**A.M.** July 1, 1897. Pods grass-green, long and straight, with a distinct curve at the stalk, averaging six beans in the pods; heavy crop; height $2\frac{1}{2}$ feet. Ready for use July 1.

3. Green Long Pod (Sutton & Sons).—Pods dark green, rather short, averaging three beans in each; heavy crop; height 2 feet. Ready for use June 28.

4. Improved Broad Windsor (Johnson).—A good form of the old Windsor Bean.

5. Robin Hood (Harrison & Sons).—× × × July 1, 1897. Pods dark green, moderately long and straight, averaging four

beans in each ; heavy crop ; height 2 feet. Ready for use July 1.

6. Taylor's Broad Windsor (Sutton & Sons).—Pods deep green and short, averaging three very large beans in each ; good crop ; height $2\frac{1}{2}$ feet. Ready for use July 1.

REPORT ON PEAS GROWN AT CHISWICK, 1897.

Fifty-three stocks of Peas were grown for trial in the gardens ; of these, six varieties were well-known and popular sorts—viz. Chelsea Gem, Ne Plus Ultra, Autocrat, Duke of Albany, Sharpe's Queen, and William the First—which were grown for comparison with the new varieties sent. The peas, with two exceptions (seed received late), were all sown on March 25, on ground trenched 2 ft. deep and well manured. In almost every case the growth was good, the crops satisfactory, and free from mildew. Two meetings were held by the Fruit and Vegetable Committee to examine the stocks. The first meeting was held on July 1 to examine the early varieties, and the second meeting on July 14 to inspect the later ones.

F.C.C.=First Class Certificate.

A.M.=Award of Merit.

× × =Commended.

1. Autocrat (J. Veitch & Sons).—**F.C.C.** 1885. Haulm and pods dark green, pods in pairs, averaging six large sweet peas in each straight pod ; flavour excellent. A splendid late variety ; height, 3 feet. Ready for use July 14. Seed wrinkled.

2. Bucks Royalty (Kent & Brydon).—Haulm and pods very dark green, pods in pairs, averaging seven large deep green peas in straight pods ; flavour good ; moderate crop ; very similar to No. 6 in appearance ; height, 3 feet. Ready for use July 1. Seed wrinkled.

3. Chelsea Gem (J. Veitch & Sons).—A well-known and favourite early variety, maintaining its fame as a heavy-cropping early variety ; height, 18 inches. Ready for use June 20. Seed wrinkled.

4. Captain Cuttle (Hurst & Sons).—**A.M.** July 14, 1897. Haulm and pods dark green, pods in pairs, averaging seven large

peas in slightly curved pods ; flavour excellent ; very heavy crop and stood the dry weather well ; height, $3\frac{1}{2}$ feet. Ready for use July 14. Seed wrinkled.

5. Compactum (Laxton).—Haulm and pods very dark green, pods in pairs, averaging seven large deep green peas in straight pods ; flavour fair ; heavy crop ; height 2 feet. Ready for use June 25. Seed wrinkled.

6. Cross No. 1 (Nutting).—Haulm and pods deep green, pods in pairs, averaging seven large peas in straight pods ; flavour good ; very similar to Autocrat ; height, 3 feet. Ready for use July 14. Seeds wrinkled.

7. De Clamant Nain Hatif (Vilmorin).—Haulm and pods dark green, pods in pairs, averaging five medium-size peas in straight pods ; flavour poor ; heavy crop ; height, 18 inches. Ready for use July 1. Seeds round.

8. Darlington Gem (Kent & Brydon).—Haulm and pods dark green, pods single, averaging six large bright green peas in straight pods ; flavour good ; moderate crop ; height, 12 inches. Ready for use June 25. Seeds wrinkled.

9. Darlington Prize Winner (Kent & Brydon).—Haulm and pods very dark green, pods in pairs, averaging seven large deep green peas in straight pods ; flavour good ; moderate crop ; height, 3 feet. Ready for use July 1. Seeds wrinkled.

10. Diamond Jubilee (Eckford).—Haulm and pods bright green, pods in pairs, averaging seven large peas in straight-pointed pods ; flavour good ; moderate crop ; height, 6 feet. Ready for use July 11. Seeds wrinkled.

11. Duke of Albany (J. Veitch & Sons).—Haulm and pods bright green, pods usually in pairs, averaging seven large peas in slightly curved pods ; flavour good ; a well-known exhibition variety ; height, 5 feet. Ready for use June 29. Seeds wrinkled.

12. Early Laxton (Laxton).—Haulm and pods pale green, pods single, averaging seven large grass-green peas in straight blunt pods ; flavour fair ; heavy crop ; height, 4 feet. Ready for use June 25. Seeds wrinkled.

13. Early Market (Watkins & Simpson).—Haulm and pods dull green, pods in pairs, averaging seven medium-size peas in slightly curved pods ; heavy crop ; very like an improved William the First ; height, 3 feet. Ready for use June 23. Seeds wrinkled.

14. *Excels All (Long)*.—A form of *Ne Plus Ultra*; height, 5 feet. Ready for use July 14.

15. *Fidler's Queen (Fidler)*. Haulm and pods grass-green, pods in pairs, averaging seven large pale green peas in straight pods; flavour good; moderate crop; height $1\frac{1}{2}$ feet. Ready for use July 1. Seeds wrinkled.

16. *Fidler's No. 2 (Fidler)*. Haulm and pods bright green, pods in pairs, averaging eight large deep green peas in slightly curved pods; good crop. A variety of the *Duke of Albany* form. Height 5 feet. Ready for use July 1. Seeds wrinkled.

17. *First Early Seedling (Nash)*. Haulm and pods dark green, pods in pairs, averaging six bright green peas in straight pods; flavour fair; moderate crop; very similar to *English Wonder*. Height 20 inches. Ready for use June 25. Seeds wrinkled.

18. *Goldfinder (R. Veitch)*. Haulm and pods light green, pods usually single, averaging six large green peas in straight blunt pods; flavour excellent. A good early form of *Ne Plus Ultra*; height 4 feet. Ready for use July 9. Seeds wrinkled.

19. *Gros Bleu Nain (Vilmorin)*. Haulm and pods dark green, pods in pairs, averaging six medium-size peas in straight pods; flavour fair; good crop; height 20 inches. Ready for use June 25. Seeds round.

20. *Harbinger (Dickson's)*.— $\times \times$ July 1, 1897. Haulm and pods grass-green, pods in pairs, averaging six medium-size pale green peas in straight pods; extraordinary crop. This should prove a valuable market variety; flavour good; height 4 feet. Ready for use June 25. Seeds wrinkled.

21. *Honeydew (Sim)*. Haulm and pods very dark green, pods in pairs, averaging five large pale green peas in straight pods; flavour excellent; moderate crop; height 2 feet. Ready for use June 30. Seeds wrinkled.

22. *Improved Gem (Hurst & Sons)*. This variety is very similar to *Chelsea Gem*, but is rather more robust. Ready for use June 23.

23. *Island Queen (Heaton)*. Same as *Ne Plus Ultra*.

24. *King of the Earlies (Yates)*. Haulm and pods pale green, pods usually single, averaging six large peas in straight pods; flavour good; heavy crop; height 3 feet. Ready for use June 23. Seeds round.

25. Little Duke (Watkins & Simpson). Haulm and pods dark green, pods in pairs, averaging five large peas in straight pods; flavour good; crop moderate; height 2 feet. Ready for use July 4. Seeds wrinkled.

26. Large Edible Podded (R.H.S.). See No. 48.

27. Magi (Eckford). Haulm and pods very dark green, pods in pairs, averaging eight large peas in straight handsome pods; moderate crop; flavour very good. This should prove a fine exhibition variety. Height 3 feet. Ready for use July 10. Seeds wrinkled.

28. Magnificent (Hurst & Sons) Haulm and pods dark green, pods in pairs, averaging six large deep green peas in straight blunt pods; heavy crop; flavour good; height $5\frac{1}{2}$ feet. Ready for use June 25. Seeds wrinkled.

29. Majestic (Watkins & Simpson).—**A.M.** July 14, 1897. Haulm and pods dark green, pods in pairs, averaging seven large peas in straight pods; flavour excellent; very heavy crop; height $2\frac{1}{2}$ feet. Ready for use July 14. Seeds wrinkled.

30. Monarch (Eckford). Haulm and pods dark green, pods in pairs, averaging eight large peas in straight pods; flavour good; moderate crop; height $2\frac{1}{2}$ feet. Ready for use July 14. Seeds wrinkled.

31. New No. 1 (Eckford). Haulm and pods deep green, pods in pairs, averaging six large peas in straight pods of the Ne Plus Ultra type; flavour good; heavy crop; height 5 feet. Ready for use July 1. Seeds wrinkled.

32. New Giant Marrow (Eckford). Haulm and pods grass-green, pods single, averaging five large pale green peas in straight pods; flavour good; moderate crop; height $4\frac{1}{2}$ feet. Ready for use July 1. Seeds wrinkled.

33. New Seedling (Carter's). Haulm and pods very dark green, pods in pairs, averaging six large dark green peas in straight pods: flavour good; moderate crop; height 2 feet. Ready for use June 25. Seeds wrinkled.

34. Ne Plus Ultra (J. Veitch & Sons). A well-known, excellent variety; height $5\frac{1}{2}$ feet. Ready for use July 14. Seeds wrinkled.

35. Prince Edward (Cooper, Taber & Co.).—Haulm and pods dark green, pods in pairs, averaging six large deep green peas in straight pods. Very like Ne Plus Ultra in appearance, but

earlier. Flavour excellent; moderate crop; height 5 feet. Ready for use July 1. Seeds wrinkled.

36. Perfection (R. Veitch).—**A.M.** July 14, 1897. Haulm and pods grass-green, pods in pairs, averaging six very large deep green peas in straight pods; flavour excellent; very heavy crop. This variety is the original stock grown by Messrs. R. Veitch & Son for forty years. Height $3\frac{1}{2}$ feet. Ready for use July 14. Seeds wrinkled.

37. Profit (Laxton).—Very similar in every respect to No. 12, except that the peas are somewhat sweeter in this variety.

38. Pollett's New Wrinkled (Hurst & Sons).—This variety was grown in the trials of 1896 under the name of Pluperfect Marrow, and also as Pollett's Early Marrow. The crop was heavy both in 1896 and 1897, and the flavour good each season. Height 5 feet. Ready for use June 28. Seeds wrinkled.

39. Potentate (Eckford).—Haulm and pods pale green, pods in pairs, averaging six large peas in straight pods; flavour good; moderate crop; height 5 feet. Ready for use July 14. Seeds wrinkled.

40. Pioneer (Eckford).—Haulm and pods dark green, pods in pairs, averaging five large peas in straight blunt pods; flavour fair; moderate crop; height $4\frac{1}{2}$ feet. Ready for use July 4. Seed wrinkled.

41. Prior (Eckford).—Haulm and pods grass-green, pods single, averaging nine large peas in straight pointed pods; flavour good; moderate crop; height $4\frac{1}{2}$ feet. Ready for use July 8. Seeds wrinkled.

42. Pride of Notts (Bell).—Not a success. Seeds received late.

43. Record (Hurst & Sons).—Haulm and pods bright green, pods in pairs, averaging six large peas in straight pods; flavour good; heavy crop; height $4\frac{1}{2}$ feet. Ready for use June 28. Seeds wrinkled.

44. Rex (Eckford).—Haulm and pods light green, pods in pairs, averaging six large peas in straight blunt pods; flavour good; moderate crop; height 4 feet. Ready for use July 14. Seeds wrinkled.

45. Royalty (Eckford).—Haulm and pods deep green, pods

single, averaging seven large peas in straight pods; flavour good; heavy crop; height 4 feet. Ready for use July 14. Seeds wrinkled.

46. *Saccharine* (Sim).— $\times \times$ July 1, 1897. Haulm and pods dark green, pods in pairs, averaging seven large deep green peas in straight pods; flavour very sweet and good; moderate crop; height 5 feet. Ready for use June 29. Seeds wrinkled.

47. *Sharpe's Queen* (J. Veitch & Sons).—Haulm and pods dark green, pods in pairs, averaging five large peas in straight pods; flavour very good; heavy crop; height 3 feet. Ready for use July 14. Seeds wrinkled.

48. *Sans Parchemin Hatif à Large Cosse* (Vilmorin).— $\times \times$ July 1, 1897. This is the largest form of the edible podded varieties. The pods and peas are cooked as gathered, and are of really excellent flavour. The labour of shelling the peas is avoided, the crop is heavy, and the variety is well worthy of a trial in any garden. Height $3\frac{1}{2}$ feet. Ready for use July 1.

49. *Springtide* (Carter).—Haulm and pods dark green, pods in pairs, averaging six medium-size peas in straight pods; flavour fair; height 3 feet. Ready for use June 21. Seeds wrinkled.

50. *St. Osyth Gem* (Carter).—Haulm and pods dark green, pods in pairs, averaging four large peas in straight pods; flavour very good; moderate crop; height 2 feet. Ready for use June 25. Seeds wrinkled.

51. *The Bruce* (Eckford).—Haulm and pods pale green, pods in pairs, averaging seven large peas in straight pods; flavour good; heavy crop; height $4\frac{1}{2}$ feet. Ready for use July 14. Seeds wrinkled.

52. *World's Wonder* (Weir).—Not a success. Seeds received late.

53. *William the First* (J. Veitch & Sons).—**F.C.C.** 1872. A well-known early variety. Height 3 feet. Ready for use June 21. Seeds wrinkled.

REPORT ON FORCED FRENCH BEANS AT CHISWICK,
1897.

Thirty-six stocks of dwarf French beans were sown on January 15, in 10-inch pots, five beans in each pot, and three pots of each variety. No hard forcing was done, all being grown on gradually, and, with three exceptions, the whole of the stocks grew well, and produced good crops of pods, which were examined by the Committee on April 21st.

F.C.C. = First Class Certificate.

A.M. = Award of Merit.

1. Canadian Wonder (Dammann & Co.).—See No. 4. First pods ready April 19.

2. Canadian Wonder Improved (Watkins & Simpson).—See No. 4. First pods ready April 12.

3. Covent Garden Early Negro (Watkins and Simpson).—Seeds black, dwarf; pods medium size; good crop. First pods ready April 12.

4. Crimson Flageolet (Dammann & Co.).—Seeds purple; tall, large foliage; pods long, pale green; heavy crop. First pods ready April 12.

The Committee decided that Canadian Wonder is synonymous with this variety, and that Crimson Flageolet is the original and correct name.

5. Early Favourite (J. Veitch & Sons).—**A.M.** April 21, 1897. Seeds speckled, dwarf, compact habit; pods of medium size; very heavy crop. First pods ready April 14.

6. Early Pale Dun (J. Veitch & Sons).—Seeds brown, dwarf, vigorous; pods of medium size; moderate crop. First pods ready April 12.

7. Early Prolific (Dobbie & Co.).—Seeds speckled, dwarf, compact; pods of medium size and heavily splashed with purple; heavy crop. First pods ready April 14.

8. Early Wonder (J. Veitch & Sons).—Seeds speckled, dwarf, compact; pods long, and heavy crop, but requires further selection. First pods ready April 12.

9. Earliest of All (Dobbie & Co.).—Seeds speckled, dwarf; pods rather long; moderate crop. First pods ready April 12.

10. Early White Prolific (Watkins & Simpson).—Seeds

white, dwarf, compact ; pods medium size ; good crop. First pods ready April 8.

11. Earliest White-seeded (Benary).—Very similar to No. 10.

12. Emperor William (Benary).—**A.M.**, April 21, 1897. Seeds white, very dwarf ; pods long, broad and fleshy ; moderate crop. First pods ready April 1. The earliest variety in the collection.

13. Gloire de Lyon (Benary).—Seeds speckled, dwarf ; pods long ; rather light crop. First pods ready April 14.

14. Golden Wax Improved (Henderson, New York).—Seeds speckled, dwarf, compact ; pods medium size, yellow and handsome ; good crop. First pods ready April 20.

15. Golden Wax Pod (Barr & Son).—**A.M.** April 21, 1897. Seeds dark brown, dwarf, very compact ; pods long, bright yellow ; heavy crop. First pods ready April 12. The best variety of its section.

16. Golden Butter Wax (Benary).—Seeds black, very dwarf, compact ; pods medium size, yellow ; good crop. First pods ready April 12.

17. Green Haricot (Barr & Son).—Seeds greenish white, dwarf, growth weak ; pods medium size, yellow ; good crop. First pods ready April 14.

18. Heinemann's Forcing (Heinemann).—Ordinary stock.

19. " " " Seed saved from selected plants in the open air.

20. Heinemann's Forcing.—Seed saved from forced plants. All three stocks of this variety made weak growth, and were practically a failure.

21. Inexhaustible (Vilmorin).—Seeds white, very dwarf and compact ; pods medium size ; good crop. First pods ready April 12.

22. Improved Mohawk (Wythes).—**A.M.** April 21, 1897. Seeds speckled, dwarf ; pods long and handsome ; heavy crop. First pods ready April 14.

23. King of the Wax (Vilmorin).—Seeds white, dwarf ; pods medium size, bright yellow ; good crop. First pods ready April 12.

24 & 25. Ne Plus Ultra (J. Veitch & Sons, and Watkins & Simpson).—**A.M.** April 21, 1897. Seeds pale brown, dwarf ; pods above the average size ; very heavy crop. First pods ready April 12.

26. Negro Algiers (Dammann & Co.).—Seeds black ; very tall ; pods medium size ; moderate crop. First pods ready April 14.

27. Negro Long-pod (Dammann & Co.).—Seeds black ; very similar to No. 26, but six days later.

28 & 29. Osborne's Forcing (Watkins & Simpson, & Dammann & Co.).—**F.C.C.** Aug. 5, 1873.—Seeds speckled, dwarf and compact ; pods rather long ; very heavy crop. First pods ready April 14.

30. Perkins' Red-speckled (Dammann & Co.).—Seeds speckled. The plants are inclined to run, and are late, and not adapted for forcing.

31. Sensation (Heinemann).—Seeds speckled, dwarf, compact ; pods short ; heavy crop. First pods ready April 21.

32. Stringless (Carter & Co.).—Seeds brown, dwarf ; pods medium size and nearly round ; good crop. First pods ready April 14.

33. Swabian Forcing (Benary).—Seeds speckled, very dwarf ; pods medium size ; good crop. First pods ready April 8.

34. Smythe's Hybrid (J. Veitch & Sons).—Seeds black, dwarf ; pods medium size ; moderate crop. First pods ready April 14.

35. Wax Gate (Benary).—Seeds stone colour, moderately dwarf ; pods medium size ; heavy crop. First pods ready April 19.

36. Wax Dwarf Digoin (Vilmorin). Seeds pale pink, dwarf ; pods medium size, yellow ; good crop. First pods ready April 3.

REPORT ON STRAWBERRIES GROWN AT CHISWICK 1897.

With the object of proving the value and characteristics of the varieties of Strawberries on trial, the Fruit and Vegetable Committee decided to test them both the first and second year of fruiting. Most of the stocks examined were planted August 29, 1895, and inspected for the first time on June 15, 1896 (see JOURNAL, Vol. XX., Part I., page 71), and for the second time on July 1, 1897. The colour and shape of the fruit of each variety will be found in the Report above mentioned in Vol. XX.

In addition to the stocks planted in 1895, fourteen new varieties were planted in the autumn of 1896 and spring of 1897, but, owing to the late date on which many of the plants were received, the majority of these fresh varieties were not in a condition to be properly judged in 1897.

It should be borne in mind that probably no fruit varies more than Strawberries, both in different seasons and on different soils. The following notes refer only to Chiswick soil and the seasons of 1896 and 1897.

F.C.C. = First Class Certificate.

A.M. = Award of Merit.

× × × = Highly Commended.

1. Aberdeen Late (Bunyard).—Moderate crop first and second year, quality poor both years. Ripe June 5, 1896, and on June 16, 1897.

2. Acquisition (Laxton). × × × 1896.—Immense crop first and second year, quality poor each year. Ripe June 8, 1896, and on June 16, 1897.

3. Admiral (Laxton).—A promising new variety sent in the autumn of 1896. Sufficient fruit was not produced to form a decided opinion on its merits.

4. Auguste Boisselot. **F.C.C.** 1890.—Good crop the first year, much heavier the second, quality excellent. The fruit seems to melt away in the mouth. Ripe June 11, 1896, and on June 16, 1897.

5. Bridehaugh (McDougal).—Fair crop the first year and poor the second, flavour good. Many of the plants died the second year. Ripe June 11, 1896, and on June 17, 1897.

6. British Queen.—Moderate crop the first year, much heavier and better in every respect the second year; well known for its fine quality. Ripe June 15, 1896, and on June 17, 1897.

7. Bonny Lass.—Light crop the first season, but very productive the second year, quality good. Ripe June 11, 1896, and on June 18, 1897.

8. Boule d'Or.—Moderate crop first and second year, quality poor; not worth growing. Ripe June 11, 1896, and on June 16, 1897.

9. Bothwell Bank.—Same as President.

10. Countess. **F.C.C.** 1896.—Splendid crop first and second

year, flavour delicious. A very fine variety with a wonderful aroma. Ripe June 11, 1896, and on June 18, 1897.

11. Crown Prince.—Poor crop each year; not worth growing.

12. Dr. Morse.—Very light crop each year, habit weak; not worth growing.

13 & 14. Dr. Vieillard (Vilmorin, Laxton).—Moderate crop first year, improving the second, quality poor. Ripe June 5, 1896, and on June 16, 1897.

15. Duc de Magenta.—An inferior form of British Queen. Ripe June 11, 1896, and on June 18, 1897.

16. Duc de Malakoff.—Moderate crop first and second year, quality good. Ripe June 15, 1896, and on June 18, 1897.

17. Duke of Edinburgh.—Poor crop each year, quality poor; not worth growing. There are two varieties under this name, this one is Roden's variety.

18. Edouard Lefort (Vilmorin, Letellier). **F.C.C.** 1896.—Splendid crop first and second year, flavour delicious. Ripe June 11, 1896, and on June 17, 1897.

19. General McMahon (McDougall).—Light crop first and second year, habit very weak; scarcely worth growing. Ripe June 11, 1896, and on June 17, 1897.

20. George Lesueur.—Heavy crop first and second year, quality not good the first year, but excellent the second. Ripe June 11, 1896, and on June 17, 1897.

21. George Wythes (Laxton).—A promising new variety sent in the autumn of 1896. Crop too light to judge accurately as to its merits.

22. Hautbois.—Good crop the first year, poor crop the second. Succeeds best from young plants.

23. Hammonia.—A failure first and second year. Weak habit; not worth growing.

24. John Ruskin.—Moderate crop first and second year, quality poor. Ripe June 3, 1896, and on June 14, 1897.

25. Jennings' White.—Light crop first and second year, quality poor; not worth growing.

26. Kimberley (Bunyard).—Practically a failure each year; not worth growing.

27. Latest of All (Laxton). **F.C.C.** 1894.—Very heavy crop

first and second year, flavour better the second year. Ripe June 15, 1896, and on June 17, 1897.

28. Leader (Laxton). **F.C.C.** 1895.—Heavy crop of immense berries first and second year, quality poor. Ripe June 11, 1896, and June 16, 1897.

29. Martha Nicaise.—Good crop first year, not so good the second, nor so good in flavour. Ripe June 11, 1896, and on June 17, 1897.

30. Mentmore (Laxton). **A.M.** 1897.—A new variety from Noble, crossed with British Queen. Not in condition at Chiswick for examination the first year, 1897.

31. Monarch (Laxton). **F.C.C.** 1895.—Heavy crop first and second year, quality good. Ripe June 10, 1896, and on June 16, 1897.

32. Mrs. Farr (Farr).—A sport from President with variegated foliage. Received late.

33. Newton's Seedling. $\times \times \times$ 1896.—Splendid crop first and second year, a fine late variety, quality excellent. Ripe June 15, 1896, and on June 20, 1897.

34. Pauline.—Crop very light first and second year; not worth growing.

35. Pioneer. **F.C.C.** 1896.—Light crop first year, heavy the second, and greatly improved. Ripe June 10, 1896, and on June 17, 1897.

36. President. $\times \times \times$ 1896.—Heavy crop first and second year, quality very good. Ripe June 11, 1896, and on June 16, 1897.

37. Prince Teck.—Moderate crop first year, improving the second year, quality excellent. Ripe June 11, 1896, and on June 17, 1897.

38. Prince of Wales (Carmichael).—No crop, plants received late.

39. Princess of Wales (Carmichael).—No crop, plants received late.

40. Princess Royal (Vilmorin). $\times \times \times$ 1896.—Moderate to heavy crop first year, not so good the second; many of the flowers were blind; quality very good. Ripe June 11, 1896, and on June 17, 1897.

41. Queen of Denmark (Carmichael).—No crop, plants received late.

42. Reeve's Eclipse.—Moderate crop first year, very light the second, quality very poor; scarcely worth growing.

43. Reward (Laxton).—Not sufficient fruit to decide on its merits, 1897.

44. Royal Sovereign (Laxton). **F.C.C.** 1892.—Grand crop first and second year, quality good. This variety was the only one not injured by the May frosts in 1897, and was also the earliest variety. Ripe June 4, 1896, and on June 10, 1897.

45. Souvenir de Bossuet (Vilmorin).—Good crop first and second year, quality fair. Ripe June 11, 1896, and on June 17, 1897.

46. Sir Charles Napier.—Heavy crop first and second year, quality good. This variety has the defect of many of the plants dying and leaving blanks in the rows. Ripe June 10, 1896, and on June 17, 1897.

47. Thomas Carlyle (Fraser).—Not sufficient fruit to test its merits, 1897.

48. Thomas Laxton (Laxton).—Not sufficient fruit to test its merits, 1897.

49. Trafalgar (Laxton).—Not sufficient fruit to test its merits, 1897.

50. Triomphe de Paris.—Light crop first year, very heavy the second, quality fair. Ripe June 11, 1896, and on June 16, 1897.

51. Trollope's Victoria (Bunyard).—A failure first and second year.

52. Unnamed variety (Letellier).—A large white-fruited variety, but not sufficient fruit to test its merits.

53. Veitch's Perfection (J. Veitch). **F.C.C.** 1896.—Owing to the plants being received late this variety was not in condition in 1897, but judging from the fruit shown at Chiswick in 1896, and at Westminster in 1897, it should prove a grand acquisition.

54. Wilson's Improved.—Light crop first and second year, quality good, but scarcely worth growing.

55. White Knight.—Light bearer first and second year, quality fairly good. Ripe June 11, 1896, and on June 18, 1897.

56. Wonderful (Bunyard). **A.M.** 1897.—Good crop first year, very heavy second, quality excellent. Ripe June 11, 1896, and on June 17, 1897.

MINUTE OF COUNCIL, *adopted April 13, 1897.*

APPLES, PEARS, AND PLUMS.

(A) FOR DESSERT, (B) FOR COOKING.

With a view to removing difficulties and resolving doubts as to the distinction to be drawn between dessert and kitchen apples, pears, and plums, the Council of the Royal Horticultural Society have caused the following lists to be prepared for the guidance of their Judges at the Society's Exhibitions and Shows.

The Council fully recognise that the line of separation between dessert and kitchen fruits must be entirely arbitrary, and to a great extent a matter of taste—which differs widely. They do not, therefore, wish it to be supposed that the varieties named in the one list are unfit for use in the other. Everyone is at liberty to use a variety for any purpose he likes, but in their opinion a fixed line of division between the two classes, for exhibition purposes, is absolutely necessary to secure uniformity, and avoid confusion and disappointment at their Shows.

The Council are also fully aware that some varieties of beautiful appearance, which do not in their opinion come up to dessert standard as regards flavour, are often placed on the dessert table. Everyone is at liberty to ornament his table with brightly coloured fruits as well as with beautiful flowers; but beauty in fruits, although a great additional advantage when it accompanies flavour and quality, does not, when standing alone, entitle a variety to rank in the technical exhibition sense as a dessert fruit.

It would be impossible to draw up lists to which everyone would agree as to the position assigned to each individual variety, and it is only by mutual concessions that a general working agreement can be reached; but that it is a good thing to endeavour to bring about such agreement the Council have no doubt whatever.

The following list will be found to include the great majority of varieties at present shown for exhibition. In the case of those not named herein the Judges must decide for themselves in which class they will put them, always bearing in mind the principles expressed in the preceding paragraphs. Judges are

requested, in the case of any variety of sterling merit, omitted here, coming to their notice, to notify their action to the Secretary of the Royal Horticultural Society with a view to future revision of the lists.

The object of the following lists should be borne in mind. It is only to decide between dessert and cooking varieties. It is in no sense to recommend any, much less all those mentioned, as being desirable varieties to plant. Such advice must be sought elsewhere and not here.

The nomenclature follows the 5th Edition, 1884, of the late Dr. Hogg's Fruit Manual.

APPLES.

Dessert.

Adam's Pearmain.
Akera, or Okera.
Allen's Everlasting.
Allington Pippin.
American Mother.
Ashmead's Kernel.
Baumann's Winter Reinette.
Beauty of Bath.
Benoni.
Blenheim Pippin.
Blue Pearmain.
Boston Russet.
Braddick's Nonpareil.
Brownlees' Russet.
Calville Rouge Précoce.
Cardinal, or Peter the Great.
Claygate Pearmain.
Cobham.
Cockle's Pippin.
Cornish Aromatic.
Cornish Gilliflower.
Court Pendu Plat.
Court of Wick.
Cox's Orange.
D'Arcy Spice.
Devonshire Quarrenden.
Duchess' Favourite.

Cooking.

Albury Park Nonesuch.
Alfriston.
Annie Elizabeth.
Beauty of Kent.
Beauty of Stoke.
Bedfordshire Foundling.
Belle de Pontoise.
Bess Pool.
Betty Geeson.
Bietigheimer Red.
Bismarck.
Bowhill Pippin.
Bramley's Seedling.
Byford Wonder.
Castle Major.
Cellini.
Chelmsford Wonder.
Cox's Pomona.
Domino.
Duchess of Oldenburg.
Dumelow's Seedling Wellington, or Normanton Wonder.
Dutch Codlin.
Early Julyan.
Early Rivers.
Ecklinville.
Emperor Alexander.

Dessert.

Duke of Devonshire.
 Dutch Mignonne.
 Early Peach.
 Egremont Russet.
 Fearn's Pippin.
 Gascoyne's Scarlet.
 Golden Reinette.
 Gravenstein.
 Herefordshire Pearmain.
 Hubbard's Pearmain.
 Irish Peach.
 Joaneting.
 Keddleston Pippin.
 Kentish Pippin, or Colonel
 Vaughan's.
 Kerry Pippin.
 King Harry.
 King of Tomkins County.
 King of the Pippins.
 Lady Sudeley.
 Lord Burghley.
 Mabbott's Pearmain.
 Mannington's Pearmain.
 Margaret, or Red Juneating.
 Margil.
 May Queen.
 Melon Apple.
 Mr. Gladstone.
 Northern Spy.
 Old Nonpareil.
 Oslin.
 Red Astrachan.
 Reinette de Canada.
 Ribston Pippin.
 Rosemary Russet.
 Ross Nonpareil.
 Roundway Magnum Bonum.
 Scarlet Nonpareil.
 September Beauty.

Cooking.

Forester.
 Frogmore Prolific.
 Galloway Pippin.
 Gloria Mundi.
 Gold Medal, or Crystal Palace.
 Golden Noble.
 Golden Spire.
 Gooseberry.
 Gospatric.
 Grantonian.
 Greenup's Pippin, Yorkshire
 Beauty, or Counsellor.
 Grenadier.
 Hambledon Deux Ans.
 Hambling's Seedling.
 Hoary Morning.
 Hormead Pearmain.
 Hawthornden, New.
 Hollandbury.
 Keswick Codlin.
 Lady Henniker.
 Lane's Prince Albert.
 Lord Derby.
 Lord Grosvenor.
 Lord Suffield.
 Maltster.
 Manks Codlin.
 Mère de Ménage.
 Mrs. Barron.
 Newton Wonder.
 New Northern Greening.
 Northern Dumpling.
 Peasgood's Nonesuch.
 Potts' Seedling.
 Rivers' Codlin.
 Royal Jubilee.
 Rymer.
 Sandringham.
 Sanspareil.

Dessert.

Sturmer Pippin.
 St. Edmund's Pippin.
 Washington.
 Wealthy.
 White Transparent.
 Williams' Favourite.
 Worcester Pearmain.
 Wyken Pippin.
 Yellow Ingestrie.

Cooking.

Schoolmaster.
 Seaton House.
 Small's Admirable.
 Spencer's Favourite, or Queen
 Caroline.
 Stirling Castle.
 Stone's, or Loddington.
 Striped Beefing.
 The Queen.
 Tibbett's Pearmain.
 Tower of Glammis.
 Twenty Ounce.
 Tyler's Kernel.
 Wadhurst Pippin.
 Wagener.
 Waltham Abbey Seedling.
 Warner's King.
 Winter Quoining, or Queening.

PEARS.

It will be sufficient to say that the following do not rank for Exhibition as Dessert Pears at the Society's Shows:—

Bellissime d'Hiver.
 Beurré Clairgeau.
 Black Worcester.
 Catillac.
 Directeur Alphanth.
 Duchesse de Mouchy.
 Gilgil.
 Grosse Calebasse.
 Idaho.

King Edward.
 Morel.
 Poire d'Auch.
 Summer Compôte.
 Triomphe de Jodgoine.
 Uvedale's St. Germain.
 Verulam.
 Vicar of Winkfield.

PLUMS.

All plums can, if not otherwise required, be advantageously used for cooking, especially if they are not fully ripe; but this does not constitute them cooking varieties in the technical exhibition sense. Similarly, some cooking Plums, *e.g.*, Blue Impératrice, if left to hang on the tree until they are shrivelled, become fit for dessert, as far as flavour is concerned; but this

does not render them dessert varieties from an exhibition point of view :—

Dessert.

Angelina Burdett.
 Anna Späth.
 Boulouf.
 Coe's Golden Drop.
 Coe's Violet.
 De Montfort.
 Denniston's Superb.
 Early Favourite.
 Gages, all varieties.
 Golden Esperen.
 Ickworth Impératrice.
 Impérial de Milan.
 Jefferson.
 Kirke's.
 Oullins Golden.
 Précoce de Tours.
 Purple Gages, all varieties.
 Reine Claude, all varieties.
 St. Etienne.
 Transparent, all varieties.
 Washington.

Cooking.

Archduke.
 Automne Compôte.
 Belgian Purple.
 Belle de Louvain.
 Belle de Septembre.
 Curlew.
 Cox's Emperor.
 Diamond.
 Duke of Edinburgh.
 Early Normandy.
 Early Prolific.
 Gisborne's.
 Goliath.
 Grand Duke.
 Heron.
 Impératrice, Blue and White.
 Magnum Bonum, Red and White.
 Mitchelson's.
 Monarch.
 Orleans, all varieties.
 Pershore.
 Pond's Seedling.
 Prince Engelbert.
 Prince of Wales.
 Sultan.
 The Czar.
 Victoria.
 Wyedale.

MINUTE OF COUNCIL *adopted April 13, 1897.*

The Council of the R.H.S. wish to remind exhibitors at the Drill Hall meetings that the object for which the various committees of the Society were constituted, and the bi-monthly meetings held, was to allow of any new or rare flower or fruit, which might be in perfection at a time when no exhibition was being held, being submitted to a body of experts for adjudication.

By degrees a practice has grown up of groups of plants and collections of fruits being also sent by exhibitors, such plants and fruits being frequently neither new nor rare, and these groups and collections have become so large and frequently so numerous that there is danger of the more important work of the committees being lost sight of.

The Council, whilst grateful for the consistent support the Society has received from exhibitors, and desirous of offering every encouragement to them and of seeing the Drill Hall always well filled, feel that the time has arrived when some limit must be put to the size of the groups and collections. They have therefore drawn up the following rules which they have directed the Superintendent to strictly adhere to :—

- I. Exhibitors at the Drill Hall of groups and collections must give notice to the Secretary, R.H.S., 117 Victoria Street, Westminster, not later than the Friday before, of their desire to exhibit, and must, at the same time, state the nature of their proposed exhibit, and how much space it will occupy: this must in no case exceed 100 square feet.
- II. Exhibits entered separately for the separate committees will be considered distinct, but not more than 100 square feet of table space can be allowed for each; that is to say, an exhibitor may stage 100 feet of fruit, 100 feet of orchids, and 100 feet of Floral Committee plants and flowers; but each group must be separately staged and consist exclusively of fruit, orchids, and hardy or tender plants or flowers respectively—not mixed together, excepting only that small decorative foliage plants may be used amongst orchids and fruit, if desired.
- III. The limit of 100 square feet does not apply to large plants placed on the floor; special arrangements should be made beforehand for such plants with the Superintendent.
- IV. No alteration is proposed in the existing rules with reference to the exhibition of new or rare plants, flowers, or fruits for the Society's Certificates and Awards of Merit.

By Order of Council,

W. WILKS, *Secretary.*

117 Victoria Street, Westminster.

N.B.—Should at any time the entries of groups be so numerous as not to allow of all being staged in their entirety, the exhibitors will be informed how much less space than that they have applied for can be placed at their disposal.

SOME TRIALS PROPOSED AT CHISWICK, 1898.

Fuchsias for greenhouse decoration.—Two plants of each variety should be sent early in the spring addressed to the Superintendent, Royal Horticultural Society's Gardens, Chiswick.

Pentstemons for border plants.—Two plants of each variety or a small packet of seed should be sent as above very early in spring.

Saxifrages for rockwork and borders.—Two plants of each variety should be sent as above during the early autumn of 1897.

Spiræas, shrubby species for hardy border plants.—Two plants of each variety should be sent as above in the autumn of 1897.

Violas.—Six plants should be sent as above in October, 1897.

New Cannas.—One plant of each should be sent as above on or before February 1.

Onions.—Seed should be sent as above at once for testing *autumn-sown* varieties.

Potatos.—20 tubers of each variety to be sent as above by February 1, 1898.

Peas.—*New varieties only*. Seed should be sent as above on or before February 1, 1898.

Tomatos.—*New varieties only*. Seed should be sent as above in January, 1898.

Radishes.—Seeds should be sent as above in January, 1898.

QUANTITIES OF SEEDS, &c., TO BE SENT, WHEN REQUIRED, FOR TRIAL AT CHISWICK.

Peas, Broad Beans, Dwarf Beans, Scarlet Runner Beans.—Half a pint of seed of each variety.

Cabbages, Kales, Cauliflowers, Broccoli, Brussel Sprouts, Savoys, Carrots, Celery, Beet, Parsnip, Turnip, Leeks, Lettuce, Onions, Radish, Parsley.—Half an ounce of each.

Potatos.—20 tubers of each variety.

Tomatos.—25 seeds of each variety.

Cucumbers, Gourds, Marrows.—Six seeds of each variety.

Strawberries.—20 runners of each.

New Fruits, &c., one or two trees, plants, or bushes of each.

Flower Seeds.—Sufficient of each variety to ensure a fair trial.

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PART II.

MUTUAL ACCOMMODATIONS BETWEEN PLANT ORGANS: OR THE STUDY OF HOMOLOGY AND ANALOGY.

By the REV. GEORGE HENSLOW, M.A., V.M.H., F.L.S., &c.

[Read July 13, 1897.]

MR. H. SPENCER and Darwin are to be credited with the honour of having presented the great doctrine of evolution, or the development of all kinds of animals and plants from pre-existing races, respectively, in an acceptable light to English readers. Every one knew that individuals were evolved or developed, because it is a self-evident fact that an egg, for example, can produce a bird or reptile. It is obvious that no being ever comes into existence full grown. Yet this was the old idea as to the first originals of all animals and plants; as Milton's imagination has so graphically described them in his "Paradise Lost." * We now know that the laws which are true for the

* In the first chapter of Genesis attention should be paid to the repeated phrase "Let the earth put forth grass," "Let the waters bring forth," &c. The words appear to indicate secondary agencies or evolutionary processes.

origin and development of the individual are equally true for the race.

When we look for some common and immediate source of the processes of development, whether in an individual or the race, we find it to reside in living protoplasm. This complex substance, together with its still more complicated nucleus, is the seat of all change in living structures. No one knows how it is done, but we readily see the effect; so that just as the different parts or organs of a bird or reptile are formed out of one and the same protoplasmic substances in the egg, so is it in plants. Their organs are developed out of a common or embryonic tissue. Out of this, by means of the protoplasm or "physical basis of life," as Huxley called it, all the organs of a plant can arise.

This formative tissue, as a rule, always develops the same organs in the right places; nevertheless, it seems rarely to quite lose the power of forming others, if it be necessary, in the place of the usual organs.

It is convenient to classify plant-organs as *axes* and *appendages*; the former being roots, stems, and branches, while the latter are the various structures which grow out of them, and are the so-called "foliar organs"; such being the leaves, stipules, leaf-scales, bracts, and the members of the four floral whorls.

Organs are said to be *homologous* when they are of the same fundamental nature (*i.e.*, *axis* or *appendage*, as the case may be), though their functions may be very different. Thus a potato is homologous with a birch-twigg, both being branches from the stem. But organs having the same functions need not be of the same nature. Thus the tendril of a pea is an altered leaf (appendage), while that of a vine is a metamorphosed flowering branch (axis). They are therefore analogous, in that their uses are identical; but they are not homologous as to their origins. Each organ of a plant sustains what may be called its normal use; but by transformation it may assume other uses, and so simulate analogous organs.

I propose giving a few illustrations only of each organ to exemplify these facts.

Roots.—Roots and stems are more or less anatomically

different, but nevertheless they are fundamentally of the same nature; and though destined for different purposes, they can both alike acquire the same functions. Thus roots normally fix the plant into the ground and supply it with mineral matters in solution, and with water. They may, however, become thick and fleshy, and act as reservoirs of nutriment for future use, as in biennial carrots and turnips, and the "tuberous roots" of the dahlia. Occasionally, if they lie near the surface, or are accidentally exposed to light, they can take on one of the functions of stems, and produce leafy branches, as may be seen in elms in a hedgerow; the hedge being often entirely composed of elm-saplings. The roots of plums and raspberries are particularly prone to throw up young plants, suggesting the hint that to propagate any plant by its roots they should be raised towards the surface of the ground or exposed. Roots may adhere to those of other plants, and become parasitic, as in broomrapes; and if exposed to light may turn green, and become assimilative organs, as in some orchids.

STEMS.—These are usually the aerial structures of support, and normally convey the fluids from the roots to the leaves. Many, however, are partly subterranean, as mints, and then they anatomically approximate the structure of a true root. If, *e.g.*, a living aerial branch be buried, as it continues to elongate, its tissues at once commence to resemble those of a normally subterranean stem, which is intermediate in structure between an aerial stem and a root. Conversely if the underground shoot of a potato reach the surface, instead of forming a tuber it grows up into an erect stem and leafy branches. But if a potato is entirely prevented from forming tubers, the tendency to do so is so strong throughout the plant that it now forms them in the axils of the leaves; proving the homologous nature between an ordinary aerial branch and a subterranean tuber.

As stems (unlike most roots) normally produce buds, it is not surprising to find subterranean stems and others upon the surface of the ground perpetually propagating the plant by means of them, as convolvulus and coltsfoot underground, and strawberries, houseleek, &c., upon the surface.

That stems can produce roots, even more readily than roots can produce buds, is known to all gardeners who propagate

by cuttings; and what they do artificially is often followed by Nature, as in blackberries, periwinkles, laurel-boughs, &c., whenever they reach and rest upon moist ground. Figs, such as the banyan, send down aërial roots, which strike into the soil and thence act as stems for support, but as roots for supplying nutriment. This use might be simulated in vines when of great extent—viz., by either encouraging aërial roots to reach the ground, or by bending a branch to the soil and making it strike root in it. It would thus aid the extremities of the vine, as has, indeed, been done with such admirable effect lately in the long Gros Colmar House at Chiswick (fig. 34).

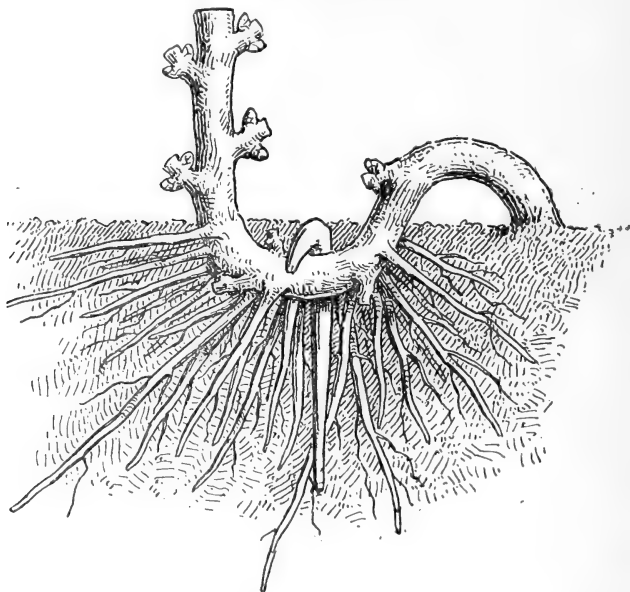


FIG. 34.—VINE BRANCH BENT AND STRUCK. (*Journal of Horticulture*.)

Another use of a stem, if weak, is the climbing up other plants so as to reach the light and air above. Plants do this in many ways and by different organs—*e.g.*, by a spirally climbing stem (hop), by conversion of branches into tendrils (vine and Virginia creeper), &c. That it is not impossible for even a root to do this, Nature gives us the exception in *Dissochaeta*, just to prove the rule; for the rootlets of this plant can become sensitive

and tendril-like. In other methods of climbing, stems are more analogous to foliar climbers.

While green foliar organs are normally concerned with assimilation, any green stem can assimilate as well, and in some cases all foliar appendages are completely arrested, the stem entirely replacing them, as in cacti, euphorbias, and stapelias. These three groups, moreover, strongly mimic one another in their forms, since by growing under similar arid conditions they have acquired a similar outward physiognomy.

Lastly, just as roots can become parasitic, so can stems, as in *Cuscuta* or dodder, which fixes itself to branches of clover, furze, &c., and then lives upon the juices of the host-plant.

STIPULES.—These, as is shown by the origin of their fibro-vascular cords, are really parts of the leaf to which they belong. They assume a variety of forms and uses. Thus, they are foliaceous in the pea and *Galium*, compensating for the loss of the leaflets in the former plant; these latter organs assuming the structure and use of tendrils. They may be spinescent (acacias), or like scarious bracts, protecting the buds from excessive heat in some desert plants (*Polycarpon*), or they may constitute bud-scales (lime, elm, oak, &c.).

LEAVES.—The normal function of the blades of these important organs is, of course, assimilation, but it can be assumed by the petiole (acacias) and by any of the other foliar appendages, provided they be green—*e.g.*, stipules (pea), bracts (hellebore), calyx and pistil of most flowers.

Since protoplasm pervades every part of a plant, we can understand the possibility, though without explaining the immediate causes, that leaves can give rise to buds and roots and so propagate the plant. This is normally done in many cases, as in ferns, *Bryophyllum*, *Cardamine*, &c.; while the gardener makes great use of this property in gloxinias, begonias, &c.

As stems can climb, so do leaves, either by aid of the sensitiveness in petioles (*Clematis*), by the apex of the blade (*Gloriosa*), or by the conversion of leaflets (partly) into tendrils (pea), and in *Lathyrus Aphaca* (entirely).

The remarkable feature of the leaves of certain plants in

catching insects, as *Saracenia*, *Drosera*, *Pinguicula*, *Nepenthes*, &c., which are scattered over the vegetable kingdom and possess no immediate affinities between them, shows that this power of digestion of nitrogenous food is a general one—as, indeed, is normally effected on the germination of seeds and sprouting of tubers when the solid reserve food-materials are dissolved and assimilated—but the insectivorous habit has become developed in some unknown way in particular groups of plants only, or in isolated members of families. *Saracenia* and *Nepenthes*, it may be observed, are cases of analogy, as the former is a metamorphosed leaf-blade, the latter, according to Sir J. D. Hooker, an altered water-gland situated at the extreme tip of the blade only.

LEAF-SCALES.—Arrested forms of leaves, called bud-scales, appear on subterranean bulbs, as of lilies. These act as store-houses of nutriment, and become analogous with tubers and fleshy roots. They can also be formed aërially (*L. bulbiferum*). In other cases they act as protectors to the young growths within the autumn-formed leaf-buds. In these it is usually the petiole only which expands without the blade (horse-chestnut, currant, ash), or else the stipules form bud-scales, the true leaf taking no part whatever (lime, elm, oak, &c.).

BRACTS.—Leaves again become scale-like when the reproductive organs are developed. They are then called *bracts*. These may be green and formed out of the petiole only (hellebore), or blade only (ranunculus). They may be coloured and petaloid, and so add to the attraction of the flowers (everlastings, some *Aroideæ*, some *salvias*, &c.). In other cases they mimic a flower by their regular form and whorled character (*Cornus*, *Darwinia*, *Euphorbia Jacquinifolia*).

FLORAL WHORLS.—It has long been an established fact that all the members of flowers are metamorphosed leaves, or rather homologous with leaves; and while transitions from one kind to another are normal in some few cases, it is a common thing for one organ to assume more or less perfectly the form of another in abnormal or monstrous conditions.

The changes may be metaphorically described as “progressive” and “retrogressive,” as the parts of any outer whorl

assume the characters of an inner one, or *vice versâ*, respectively. A few illustrations will explain this.

In *Hydrangea* and *Fuchsia* the calyx is normally petaloid, but in the "cup-and-saucer" campanulas, and "hose-in-hose" *Mimulus*, the calyx has abnormally acquired all the features of a corolla. In water-lilies the transition between petals and stamens is normally characteristic, while in a monstrous foxglove I once noticed the corolla was split up into stamens. In the "rogues" among wall-flowers, and in poppies and oranges, the stamens often become abortive carpels, while begonias are particularly liable to produce all sorts of mixtures between staminate and pistillate structures.

Retrogression is seen in carpels and ovules becoming more or less of a staminate character, as in willows, and in roses, &c., described by Dr. Masters in his "Teratology." Sometimes ovules become petals, as is not infrequent in lady's smock (*Cardamine pratensis*), and in a rhododendron received from Mr. Veitch. Sometimes they become foliaceous, as in a mignonette described by the late Professor J. S. Henslow. Stamens, as well as carpels, turn into petals, as in complete double flowers, and then become multiplied. A further retrogression is seen in their becoming foliaceous, as the pistil of the double cherry, the green rose, the alpine strawberry, &c. In forms of primroses, the corolla alone, or the sepals only, may turn into leaves. Since it thus appears that all the organs of a flower are but leaves in another form, a flower-bud is therefore homologous with a leaf-bud; and as the latter can develop into an elongated branch with leaves, or else assume the abbreviated form with leaf-scales, as of a bulb, so can a flower-bud become replaced by either one or the other; the axis not infrequently elongating in roses, or forming bulbils in place of flowers in onions.

Lastly, minute bracts, as of plantains, may grow out into true leaves, thereby revealing their homology. The general practical result issuing out of these phenomena, is that if Nature shows any sign of departure from the normal structure of an organ in a flower or elsewhere, the horticulturist has it in his power to encourage the change, and, it may be, ultimately to fix it if it be desirable to do so. Thus the whole of the balsamæflora section of the E. I. Rhododendrons raised by Mr. J. Heal for Messrs. Veitch were secured by his detecting a slightly petaloid

anther in one flower. He fertilised the pistil with the pollen of the same flower. From this fifteen double and semi-double offspring were obtained; and so he laid the foundation of that admirable section of greenhouse rhododendrons.

Again the principle of homology shows that, protoplasm being common to all parts of the plant, any one part, if in an active state of growth—*i.e.*, still with embryonic tissue—may be utilised for propagating purposes, since any fragment carries within itself, potentially, the whole plant. Hence arises the ease in multiplying any variety; while to perpetuate and fix a variety, constancy in the external conditions should be maintained as well as self-fertilisation of the flowers. On the other hand, if diversity be looked for and new varieties desired, as much difference as can be obtained in the nature of the environment as possible should be secured, and the intercrossing of distinct races and species should be practised.

CHISWICK, JULY 14, 1897.

A DESIRE having been expressed by many Fellows of the Society that a meeting should be held at Chiswick some time during 1897, the Council decided to invite the members of all the Committees to lunch with them at the Gardens on Wednesday, July 14. Invitations were issued accordingly, and about seventy members, in addition to the Council and officers, attended on the appointed day.

Having examined the various trials in progress, and noticed the new glass-houses erected during the last two or three years, the company sat down to an excellent luncheon, provided by Messrs. Spiers & Pond. The President, Sir Trevor Lawrence, Bart., occupied the chair, supported by Sir Joseph Hooker, G.C.S.I., C.B., and the members of the Council.

Each of the Society's five Committees was well represented, there being present ten members of the Scientific Committee, twenty-one of the Fruit Committee, twenty-two of the Floral Committee, sixteen of the Orchid Committee, and four of the Narcissus Committee.

The toast of her Majesty having been duly honoured, the President rose and gave to all a hearty welcome, expressing his

pleasure that so many had been able to attend on the occasion. He desired to convey the Council's sincere appreciation of the services of the different Committees, the members of which so willingly attended the several meetings for the sole object of aiding the Society to do all that could be done in the interests of horticulture. The Scientific, Floral, Orchid, Narcissus, and Fruit and Vegetable Committees did each in their sections work that could not be otherwise done so well, as the members possessed special qualifications, and some of them travelled long distances to discharge their duties without fear or favour. They gave their time freely, and not without cost to themselves, solely to advance the art in which all were interested, and in a spirit of good-will to the Royal Horticultural Society.

At three o'clock, the luncheon tables having been cleared away, the President again took the chair, and Dr. Maxwell T. Masters, F.R.S., delivered an address on the better utilisation of the Society's Gardens, entitled,

WHAT CAN WE DO AT CHISWICK?

[In the following notes is embodied the substance of an address on "Suggestions for the better utilisation of Chiswick Gardens," by Dr. Maxwell T. Masters, F.R.S., &c., which at the request of the Council was delivered at the meeting of the committees at Chiswick on Wednesday, July 14, 1897. In sending the following paper Dr. Masters says: "In writing out these notes the subject has here and there been slightly expanded, and matters are herein alluded to for the mention of which in a spoken address the time was not sufficient. Purely cultural matters have been passed over in the hope that some competent authority may favour the Society with some observation on the development of the garden from the point of view of the cultivator."]

In considering the best means for "the development and further utilisation of the Chiswick Gardens"—a subject which the Council honoured me by requesting me to introduce—in the first place, the meeting of all the committees here to-day may be adduced as one illustration of what was desired; and in thanking the Council I only express the gratitude felt by

all the members of the committees for this opportunity of meeting. Nothing could have furnished a clearer proof of the hold that Chiswick has upon the minds of horticulturists. The traditions of the past are indeed glorious. Think of the multitude of plants introduced by Douglas, Hartweg, and other collectors, grown, described, illustrated and distributed from these gardens. Think of the work of Lindley, crystalised and enshrined, so far as gardening is concerned, in his "Theory of Horticulture," which had its origin here in these gardens. Recall the careful and accurate labours of Robert Thomson in the department not only of pomology but of meteorology. Let us not overlook the labours of Gordon among conifers, nor bury in oblivion the earlier labours of Sabine, of Bentham, and many others recorded in our Transactions and Proceedings.

Coming to more recent times, we may surely advert with satisfaction to the various "conferences," many of which have been held within these gardens. Speaking generally it may be asserted, without fear of contradiction, that by no other means has so much and such trustworthy information on the particular subjects concerned been brought together and put at the disposal of the public as by these meetings and exhibitions. As a few illustrations take the Apple conference, the Rose conference, the Chrysanthemum conference, the Conifer conference, and others. Fortunately the records of these meetings are given in our Journal, but writers and speakers seem now and then to ignore them, and require to be reminded of their great value as store-houses of facts. Does it not even seem as if the Council under-estimated the exceeding value of these meetings? It cannot really be so, of course, but the fact remains that the conferences have of late been abandoned and one reason for visiting Chiswick thus annulled. If this abolition be due to the fact that financially these meetings were not successful, it may be urged that such meetings should not be judged according to an immediate financial standard. The results are to be looked for in the advancement of horticulture and the increased reputation of the Society. Surely such objects as these "will pay" in the long run if not immediately. There is no need or desire to disparage the ordinary flower-shows; they have their value as outward and visible signs of skill, labour

enterprise; they encourage the gardener, stimulate the amateur, and please the public. Moreover, if successful, they help to fill the coffers of the Society and are regarded with corresponding favour by our treasurer. But as a means of collecting, and of diffusing knowledge among practical horticulturists, they fall far short of the conferences just mentioned. Moreover, they do little to improve upon those routine or rule of thumb procedures which were as well if not better carried out by our predecessors.

In considering the means, therefore, by which the utility of Chiswick may be enhanced it may be pleaded that at least one such conference be held annually in these gardens, and that as many definite opportunities as possible should be afforded to the Fellows of meeting within this truly time-honoured enclosure. In these busy days when every man's time is fully occupied, it is of no use to say "the gardens are open daily." Unless there is a special reason for doing so, few of us can find, or make, the time to make the journey to Acton Green. As it is, the Committees do pay occasional visits to the garden for the purpose of inspecting the plants cultivated for trial, and of adjudicating upon their merits. Some of us at least would be glad of the opportunity of visiting the garden at the same time. If, without interfering with the judicial labours of the Committee, some one could be told off on these occasions to explain the objects of the trials and to give any incidental information concerning them the benefit would be great and the interest in the garden enhanced.

Whilst not disregarding the lessons of the past, although altered circumstances have to some extent rendered them inapplicable, we may turn to the present, and devote some consideration to the future.

Of the present it is not necessary to say much. The mantle of our respected friend Barron has fallen on the shoulders of his successor Wright—and it fits! We can all see for ourselves what is being done, and how it is done. Furthermore we are all agreed that the trials of garden-plants, decorative or utilitarian, should be carried on with the same impartiality as heretofore. It may be—it is objected that some of the trials are necessarily on a much more limited scale than are those under the control of the great seedsmen and nurserymen in

their own trial grounds. That is no doubt true, but this defect is compensated for by the wider choice of objects submitted for trial, and by the absolute freedom from bias which has characterised the Chiswick trials and won for them the respect of the horticultural community. The records of these trials are published in our Journal, but not always with sufficient promptitude to allow the fullest use to be made of them by those concerned in commercial transactions. This delay is no doubt in a great measure unavoidable. One other defect in the records may be pointed out, as it may readily be remedied. The plants are of course grown for a special object, phloxes for their flowers, strawberries for their fruit, and so on. It is therefore essential that the descriptive notes should be taken of these special points. But the variation in fruit and flower is almost invariably accompanied by some corresponding diversity in habit and foliage and other points, which should be also recorded.

These notes on "habit," to use the word in its most comprehensive sense, are of course not wholly overlooked, but they require to have more attention paid to them than is at present done. The scientific value of such notes duly co-ordinated and classified would eventually be very great, whilst the practical cultivator of to-day would find them of great use to him in ascertaining the limits of groups or types, in determining the extent and direction of variation, in identifying particular varieties, in suggesting appropriate methods of culture, and even in furnishing him with hints as to the best method of packing and of "marketing" generally.

Without dwelling longer on the present, of which we can all judge for ourselves, we may now turn to the future and, as a preliminary, ask ourselves with reference to Chiswick, do we as horticulturists and members of a learned Society get all the advantages that we ought to get out of our garden, shorn though it be of its ancient proportions and more or less exhausted as its naturally poor soil must be by the culture of many decades? On higher grounds than those concerning merely personal interests we may ask: "Are we at Chiswick doing our duty to horticulture?" These questions have already been partially answered, and in the affirmative with reference to

the trials; but the answer is only partial, and in some other respects it is to be feared the response must be in the negative.

Horticulture, if the entire body of thoughtful cultivators may be so personified—horticulture looks to us—to the Royal Horticultural Society and to the Council as our representative—to take the initiative, so far as circumstances will permit, in all matters concerning the development and welfare of our art. In considering this phase of the subject and leaving purely cultural details to those more competent to speak with authority, we may consider the matter of our future development at Chiswick under the two heads, those of education and of instruction.

For educational purposes, it may be suggested that Chiswick should be made as perfect an object-lesson as it is possible to make it. The days for indiscriminate collections of fruit trees, vegetables, &c., are gone, and we have not room for them; but we might have what may be called type-collections, or, rather, selections of what are generally admitted to be the best races of vegetables and fruits. These would form a standard of comparison of the utmost use in connection with the trials just alluded to. We do not want in our type collection Messrs. So-and-So's "maximum superbum," nor Messrs. Somebody Else's "maximum superbissimum improved." These may indeed find their place at the proper time in the trial grounds to ascertain what, if any, difference there is between them, and how they differ from the recognised types, but in the permanent educational plots now under consideration we should look, let us say, for specimens of the best *types* of cabbages, savoys, Brussels sprouts, kails, broccolis, and so forth. Thus the young gardener and the amateur might at the appropriate season be sure to see and be able to appraise the value of the most generally useful varieties. And as for cabbages, so with lettuces, potatoes, tomatoes, fruit trees, and even florist's flowers and decorative plants. So treated, the vegetable and fruit quarters, and the plant-houses, would be as books of reference containing all that is essential in orderly arrangement, but not bewildering the student with countless details. At intervals lectures should be given calling attention to these variations, and their characteristics and special uses, with demonstrations as to cultural matters. Needless to say, the best methods of cultivation, pruning, training, &c., should

be exemplified in each case according to circumstances. Such demonstrations would furnish another reason for those occasional meetings at Chiswick, which have been advocated in the earlier part of this address, and would quickly and easily diffuse information, which could not be grasped so readily by a student without such aid.

Together with these object-lessons, provision should be made for research in the form of trials and experiments on all or any suitable matter of horticultural interest, such as the practical value of various manures, the effects of particular methods of pruning, the value of particular stocks, the efficacy of root-pruning, and so forth. Experiments with various "sprays" in the prevention of the attacks of insects or fungi require to be made with care and discrimination. There can be no doubt as to their value in particular cases under appropriate conditions, but it is a question whether our American friends do not attach too much importance to them as a general panacea, and apply them when commercially speaking there is no need to do so. At any rate, one of the questions that might be determined here in principle, has relation to the practical utility of spraying, to the best modes of carrying it out for different purposes, in different cases and in different seasons.

Scattered through Germany, France, and other continental countries, and especially in the United States, are very numerous experiment stations, from some of which we might derive some useful hints. Under this impression application for information was addressed to Professor Bailey, of Cornell University, whose answer is here given :—

"Ithaca, N.Y., May 31, 1897.

"Dr. Maxwell T. Masters, London, Eng.

"My Dear Sir,—Your request for information is at hand, and in reply I may say that we do not have very large plantations of fruit at the University, but carry on investigations in the large commercial orchards of western New York, of which there are thousands and thousands of acres. We are especially concerned in the methods of cultivating and fertilising orchard lands, in spraying for insects and fungous diseases, determining the very important questions of self-sterility of flowers, adapta-

bilities of new varieties, the methods of evaporating, marketing, and similar work.

"At this station we are making a special effort to find out something about the Japanese plums, and this year we shall fruit something like fifty varieties. We have already published two bulletins upon the question.

"I am much interested in your English agitation upon fruit-growing, and it seems to me that the very thing for your people to do, is, to send some wide-awake man over here to study the orchard interests of our country. I am sure that this is one of the very few directions in which your English horticulturists can learn from Americans. This is a side of horticulture which has been enormously developed in this country.

"In nearly all matters we must look to you, especially in matters pertaining to vegetables and glass-house gardening, ornamental planting, and the like. It seems to me that there should be a freer interchange of experiences between the two countries. I certainly derive very much inspiration and help from the work of your horticulturists, and want to look in upon some of their work again during the present summer.

"If you want any detailed statement, as to what the stations of this country are trying to do in fruit-culture, I should be glad to serve you if I can. Our plantations altogether do not number ten acres in extent at this place, but we are able to learn a great deal from that area. We have another experiment station in this State at Geneva, where it is attempted to keep growing all the varieties of fruits which will thrive in this climate. Both our National and State Governments are very liberal in supporting these institutions, and there is no question whatever but that the results have been productive of great commercial good. Our fruit-growers are energetic, wide awake, progressive and happy.

"Yours very truly, L. H. BAILEY,

"Professor of Horticulture, Cornell University."

From Prof. Waugh, of Burlington, Vermont, comes another letter which gives a good idea of the kind of work done:—"There are," he says, "fifty-four agricultural experiment stations in the United States, 48 of which maintain each an officer in charge of horticultural experiments. In about 40 cases the

horticulturist has no other duties ; in about 30 cases the horticultural work is prosecuted with some vigour ; and in about 20 cases the horticultural work attains real importance, the horticulturist being aided by one, two, or three trained assistants. Nearly all of these stations are comparatively very young, having been organised since 1887. The work is not therefore settled in all of them, and the supply of well-trained men fitted for scientific investigation along horticultural lines is still considerably below the need. In certain sections there has always been in operation the notion that men of so-called "practical" experience would be most likely to secure good results in horticultural experimentation ; but all the experience of a decade is against that belief. It is seen more clearly each year that progress is being made only as investigators apply themselves to fundamental principles ; *i.e.* to the underlying sciences. Thus scientific talent of a high order is required to solve the complicated problems in applied science, such as make the study of plant culture. Indeed, much of the best work has been done for horticulture by botanists, mycologists, and entomologists, who make no pretensions to "practical" training.

"This is well illustrated in the matter of the treatment of plant diseases. I suppose that the practice of spraying is nowhere better understood or more effectively carried on than in America ; and almost every increment of progress has come from experiment station work. Mr. Lodeman's recent book on "The Spraying of Plants," is an excellent index of our knowledge on this subject and its sources. This line of study in particular has shown results of incalculable value chiefly through the work of the mycologists.

"The work of botanically inclined horticulturists, among whom Professor Bailey, of Cornell University, deserves special mention, has put our knowledge of classificational pomology on a scientific and rational basis. The mere record and description of varieties is now seen to be of very slight permanent value. The study of groups, and types, and natural relationships ; or of variation, its directions, causes, and limitations, is seen to have a much deeper significance, a broader application, and a much higher practical value.

"Experiments in propagation, cultivation, and fertilisation have given varying results—sometimes worthless, sometimes

highly valuable—depending on the intelligence with which they have been planned and executed. Merely as examples of the multifarious lines of work successfully prosecuted by horticulturists, I will mention the following:—Control of flowering seasons in fruits by mulching, &c.; influence of electric light on plants; methods of irrigation; the necessity of cross-pollination in various apples, pears, plums, and grapes; the protection of peach trees against winter freezing; the distribution and eradication of weeds; the preservation of fruits for market; the acclimatisation and distribution of many fruits; methods of pruning and training; forcing fruits and vegetables, &c., &c.

“The work is yet unorganised and imperfect in many particulars; but a fairly general agreement has been reached as to the experimental methods which give best results. The actual fruit growers most interested in the work of the experiment stations, and all those most closely connected with them, feel, I think, that we shall make still further progress just as fast as we have investigators thoroughly and broadly trained in the sciences and capable of pursuing independent, original scientific research, and as fast as the management of the experiment stations is taken out of the hands of unworthy politicians, so that such trained scientists may be employed in place of incapable favourites who still hold a few of these positions.

“F. A. WAUGH.

“Burlington, Vermont.”

Turning now to the instructional features that might be introduced at Chiswick, it may be pointed out that in many of the experiment stations alluded to in the preceding letters, there are horticultural schools where a thorough training in the principles underlying cultivation is afforded, as well as instruction in the technical details of plant cultivation. The word training is employed because dogmatic teaching is in these institutions, as elsewhere, as far as possible, superseded by practical work. The student is now expected to verify for himself, so far as circumstances will allow, the details and explanations afforded by lectures and text-books. We have not in this country yet anything that we can put alongside of the horticultural schools of Versailles, Ghent, Vilvorde, or Berlin; but a commencement has been made, and at Chelmsford, under the auspices of the

Essex County Council, at Swanley, in Edinburgh, are schools where the principles of horticulture are practically taught, and where the practice is constantly referred to the principles underlying it.

If we cannot have such a school at Chiswick, and at present that seems impracticable, we might at least in justice to our students do something more for them than merely allow them to carry out the routine duties of the garden. At Kew valuable series of lectures and demonstrations are given which are much appreciated by the young men, and which may be of incalculable value to them hereafter. What a boon it would be to our Chiswick students if haply they might be permitted to avail themselves of these lectures. Already, we believe, the young gardeners from Kew occasionally avail themselves of these gardens for the purpose of seeing carried out those operations in the culture of fruit and vegetables which form no part of the work at our noble national establishment. Chiswick and Kew are but a mile or two apart. Would it not be of great advantage if, so far as the instruction of gardeners goes, this reciprocal action could be regularised and extended so that the one establishment could be made the complement of the other? Government aid cannot be expected in this country for the development of any such scheme. It is not our way of doing things to rely on State aid. At the same time many of the County Councils have shown and are showing a desire to utilise the funds placed at their disposal in the promotion of the higher education of gardeners, and were a suitable scheme propounded it is hardly to be doubted that substantial aid and encouragement might be forthcoming from this and probably from other sources.

DISCUSSION.

Sir JOSEPH HOOKER expressed his pleasure at being present at such an interesting meeting, and listening to such an interesting discourse by Dr. Masters. He was, perhaps, the last man in this country with a knowledge of horticulture as it was in the twenties. David Douglas, that famous collector of the Royal Horticultural Society, was a personal friend of his, and from him he received a good deal of instruction in his early days. Indeed, he once saved his life by pulling him out of the rapids.

From Douglas's day to this he did not know of anyone who had done so much for horticulture, and nothing was more interesting to him than to see the plants which he introduced growing in the plant borders and shrubberies. There was one great difference, he said, between conducting any experiments in England and abroad: it was, that abroad the Government assisted and encouraged such undertakings, but in England they had to be carried out by private enterprise. In the United States there were so many kinds of destructive pests—both fungoid and insect—that it became absolutely incumbent on the Government to create experimental stations with a view to discovering the best means of combating these enemies to horticulture and agriculture. He was greatly in favour of the higher education of gardeners, but he thought there might be some little difficulty as to enabling the Chiswick students to participate in the Kew lectures. He did not anticipate any help whatever from the Government in the way of a grant; and he remembered well, when Director of Kew Gardens, the great difficulty he had to obtain £100 a year from the Treasury for providing lectures for the young gardeners. Although he believed in lectures turning out a better class of gardeners, he said that at first he was much disappointed, because, after having instituted the first course of lectures at Kew, he received a deputation from the young gardeners, asking that a course of lessons in "ribbon gardening" should be substituted for the lectures!

Mr. H. J. VEITCH said he remembered the gardens before their dimensions had been curtailed; and, considering the effect of the drainage system and growth of London upon the atmosphere of Chiswick, he thought that if experiments were to be carried out on anything like a large scale, it would be advisable to conduct them elsewhere than at Chiswick. The gardens of the Society would, in his estimation, become gradually less valuable with time as an experimental station, and it would be necessary to seek a better soil and a purer atmosphere.

Dr. C. B. PLOWRIGHT was in favour of spraying experiments being carried out at Chiswick, and of the results being published. He noticed that in an atmosphere vitiated by sulphur, fungoid diseases were almost absent. He did not know whether there was much or any sulphur in the Chiswick atmosphere, but he noticed a comparative absence of fungoid attacks. Dusting with

sulphur, burning affected parts, spraying with Bordeaux mixture, had all been tried as remedies, and now sulphide of potassium seemed to be the great destroyer. Practical experiments, however, were the only reliable methods to depend upon, and he thought Chiswick a place in which they should be conducted.

The PRESIDENT said the Council had already considered the question of making Chiswick a proper school of horticulture, and a few years ago the matter had been thoroughly discussed, with the result that certain difficulties were found to be in the way. No doubt the County Councils were "squeezable" to a certain extent, but as a rule these bodies wanted a *quid pro quo* for any money which they expended. If some method of giving the Councils a return could be devised, then something might possibly be done. There was no doubt little progress would be made until the question of diseases and how to meet them was taken up more generally by gardeners. The Germans were ahead of us in this respect, and they seemed to spare no pains in producing expert chemists to study various diseases, and attached great importance to their training. We, on the other hand, were still satisfied with our old "rule of thumb" methods, while America was going in for experiments on a large scale. If there was any chance for the Society to improve matters he thought it would do so, but it was useless to expect any help from the Government.

The Secretary of the Society, the Rev. W. WILKS, said that he had received a great many letters from absent members of the Committees, expressing regret at their not being able to be present that day, and he asked leave to read two of them, coming, as they did, from such diverse places and persons, viz., from Monsieur Henry de Vilmorin, in Paris, and from Mr. Malcolm Dunn, in Dalkeith. M. de Vilmorin wrote: ". . . . In my opinion the tests of garden varieties of plants, as they are at present conducted, would alone suffice to make Chiswick eminently useful." Mr. Malcolm Dunn wrote: ". . . . I do not know the views that are held by the Council upon the 'better utilization' of Chiswick Gardens, but whatever may be suggested, I sincerely hope nothing will be done to spoil their great value as an independent testing centre for the horticultural productions, new and old, of the country. Whatever is said to the contrary by cranks and self-interested and disappointed people, the gardens have been, and

are still, looked upon as the most independent and fairest establishment in the country for testing the merits of horticultural productions, and the verdicts passed upon them have undoubtedly been looked upon by the general horticultural public as a fair and unbiassed estimate of their value. It is no doubt quite true that errors have been made, but with all that, the good work done has been invaluable to the horticulturists of the country, and its cessation would be a severe loss to gardeners, whatever it might be to the introducers of novelties."

GARDEN INSECTS.

By MR. W. D. DRURY, F.R.H.S.

[Read July 27, 1897.]

[The illustrations to this paper have been kindly supplied by Mr. Upcot Gill from the new edition of Nicholson's "Dictionary of Gardening."]

INSECTS generally play such an important part in the economy of Nature, that it is astonishing how little they are understood by the gardener, be he amateur or professional. This is the more to be regretted since that little learning which is proverbially considered dangerous would often mean just the difference between success and failure with his crops. True, of recent years, the advantages of the study of entomology in respect of its bearing upon the garden have been forced upon the cultivator, and the economics of the subject have been placed before him in a manner undreamt of in the philosophy of the old-time gardener. We have, for instance advanced considerably since the days when the aid of the parish officials was invoked to clear away the useful little ladybirds. Yet rather more than sixty years ago that was done by a town now so closely identified with horticulture as Reading. There had been a tremendous influx of these beetles, and it is recorded how the "wiseacres requisitioned the parish engines and private ones to pour upon the useful creatures tobacco-fumigated water, to attack and disperse them." Still, with all the advances made, we are yet a long way behind our American cousins alike as regards the theoretical and the practical side of economic

entomology. Even our Continental neighbours are ahead of us—a circumstance which tends to place those responsible for the tilling of the soil at a considerable advantage over their less fortunate brethren in this country. In the secondary schools in Germany biological science forms part and parcel of the educational curriculum, and thus a most useful foundation for the study of insects is laid at a very early age, and at a time when the mind is so receptive, that what is then taught is invariably retained in after life when more serious work is taken up. In England the case is very different, and it is quite the exception for even the most elementary knowledge of insects to be imparted in schools; while the man or youth who essays to learn something of the creatures with which he may come in contact is viewed in the light of a lunatic, his net and other collecting paraphernalia being considered by every yokel as abundant evidence of his particular form of madness.

Again take the case of the amateur gardener. How seldom is it that he troubles to inform himself concerning the numberless creatures which in the pursuit of his hobby necessarily come across his path. He knows "greenfly" when he sees it, perchance "wireworm," and the symptoms of attack of certain other creatures; but of their life-history he knows absolutely nothing, and he depends almost entirely upon rule-of-thumb methods for dealing with all sorts of pests. To him nearly every small creature is regarded as an insect—from the wood-louse or the centipede to the garden spider and the slug. Yet an insect is so well defined that even the veriest novice, once he has been informed as to its chief characteristics, could not well make a mistake. So accustomed, too, is he to regard the destructive propensities of the many, that the utilitarian properties of the comparatively few are almost invariably overlooked or altogether ignored. Only too ready is he to crush out of existence some creature of whose place in the economy of Nature he knows little, and about whose value he appears to care less. Maybe it is a repulsive-looking insect which has been turned up with the soil, or which has been summarily ejected from its day retreat. This ugliness is quite sufficient to seal its doom, and without a moment's consideration the creature is ruthlessly destroyed. Beetles in particular seem to come in for more than their share of this ill-bestowed attention, and it is

no untruth to say that each year thousands of the most useful kinds are sacrificed at the shrine of Ignorance. Some may urge that with so vast an order as the *Coleoptera* it is impossible for the gardener to decide which are useful and which injurious. This fact, however, remains : the most useful of all the beetles are without exception those most commonly met with in gardens, and thus they may be readily identified. This also holds good with many insects belonging to other orders. Nowadays one often hears the older gardeners say that in their time not half so much was heard of the injuries inflicted by insects upon crops. To a certain extent this is correct, and the fact is readily accounted for. The area of land under cultivation is far greater now than at any previous period in the history of horticulture, and in the process, the beautifully delicate balance of Nature has been rather rudely disturbed, and we are suffering accordingly.

Within the space of such a paper as this it is not possible to do justice to a subject which opens up such a wide field. My object will be rather to stimulate the coming generation of gardeners to greater things, and to prosecute still further the studies which the entomologists of our day have done so much to promote. Horticulture and entomology are very intimately associated—so intimately in fact that to be successful in the one the gardener must have more than a passing acquaintance with the other. There is a wide field for investigation in which at present the labourers are all too few.

In making a few brief remarks upon some of the more important orders which go to make up the Class *Insecta*, it will be well to commence with the beetles. Their extreme diversity of form, size, colour, and marking, their peculiarities of structure, their divergent habits, the conditions under which they are found, their wide geographical range, and their enormous numbers, invest them with more than an ordinary interest to the student of Nature. This exalted position among insects is one to which perhaps the majority of entomologists think them entitled, though there are a very large number who aver that the *Hymenoptera*, on account of their higher development and superior intelligence, are entitled to first rank. The question, however, is a vexed one and has but little practical bearing upon the subject.

Coleoptera.—Of the vast beetle army which are concentrated in gardens none are more familiar than certain representatives of the genus *Carabus*, or Ground beetles, and none are entitled to greater respect at the hands of the gardener. It is the type of the great family *Carabidæ*, to which belong by far the greatest number of carnivorous species. Indeed with two or three exceptions none are vegetable feeders. No garden is too small to yield its quota of these insects, which are not only large but

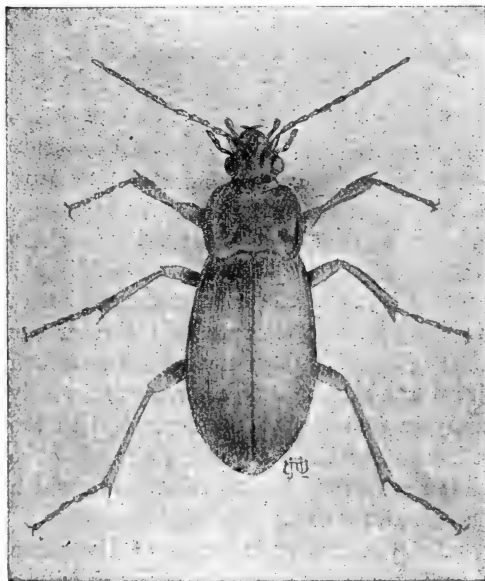


FIG. 35.—*CARABUS NEMORALIS* (twice natural size).

often beautifully coloured. Three species are commonly met with in gardens: *C. nemoralis*, Fig. 35 (*C. hortensis* of some authors), with brassy, coppery, or green wing-cases; *C. violaceus*, with black wing-cases, whose margins are variously coloured with blue, purple, or bright red; and *C. monilis*, with green, coppery, or violet wing-cases elegantly granulated, each of three

rows of dots being divided by raised lines. All are familiar and equally lovely. Neither of these beetles is capable of flight; for the simple reason that it possesses no wings; while the wing-cases if examined will be found "soldered," as it is termed. Though they are not able to fly, they can run with great rapidity, and will travel long distances in search of food. Their good deeds are undoubtedly lost sight of by the majority of gardeners, as the insects are nocturnal, lying concealed during the day-time under stones, flower-pots, and the like. They are exceedingly rapacious, and with their powerful jaws soon make

short work of any vegetable-feeding beetle, mollusc, or earth-worm, which they may come across. Nor is it only as perfect insects that they are of service: the larvæ are equally useful. These elongated creatures, like the perfect insects, are provided with formidable jaws, while at the other extremity of the body are two horny processes each armed with a sharp point. Unfortunately little is known of the larval life of beetles generally, as, unlike the larvæ of many lepidopterous insects, their habits are such that they cannot be readily observed.

On the Continent there is another most useful garden *Carabus* (*C. auratus*). It is a veritable gem as regards colouring, the brilliant metallic green wing-cases, with golden reflections, being indescribably beautiful. From time to time specimens of this insect have been captured on produce consigned to the London and other markets; but we cannot with good grace claim it as a native. In France it is as common as the three species with us already noted; and it is always welcomed by the horticulturist, as it keeps in check those pests the cockchafers.

Equally well known as the Ground beetles, though not as useful, are the pretty and somewhat variable "Sunshiners" (*Amara*), which from childhood's day one is taught to protect; for to kill them is to bring rain. On any fine warm day in spring these beetles may be found darting hither and thither in bright sunshine, or maybe making use of their ample wings. Amongst these we find both animal and vegetable feeders, but the good done by the majority more than atones for the delinquencies of the one or two which eat the seeds of certain plants. *A. aulica* is the largest of the familiar "Sunshiners"; it measures about half an inch long, and is of a pitchy-black colour. These little beetles are often found under stones and garden rubbish.

Closely allied to the "Sunshiners" is an insect often

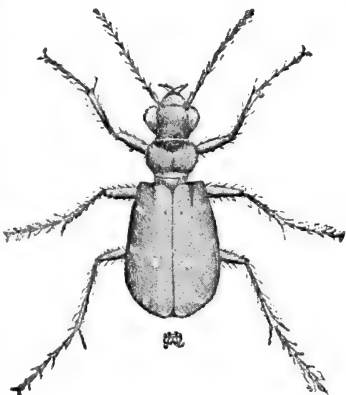


FIG. 36.—*CICINDELA CAMPESTRIS*
(much enlarged).

abundant in gardens—*Harpalus ruficornis*. Like them, it loves bright sunshine, and may be found disporting itself on warm spring days. It is, however, chiefly nocturnal, and on dull days may be ousted from its retreat under stones. Occasionally this species indulges in a vegetarian diet, and the luscious strawberry affords the necessary variation. This insect is of oblong form and of extremely sombre colouring, the only relief to its funereal hue being furnished by the reddish antennæ and legs. I have taken it by dozens in strawberry-beds which have been mulched.

In sandy localities may be noticed on the wing, in bright sunshine only, a number of insects swift of flight, but whose

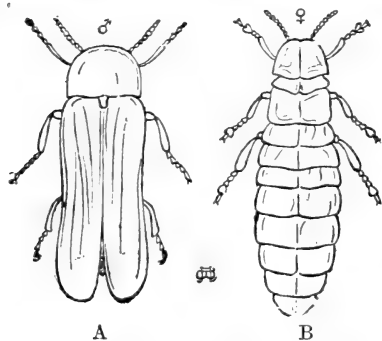


FIG. 37.—MALE AND FEMALE GLOWWORM
(*Lampyris noctiluca*).

outward form it is practically impossible to recognise. If they are closely watched, as they can be—for although their flight is rapid the actual distance travelled is not great—they will be at once distinguished as the ferocious little Tiger beetles, which, when captured, will frequently with their jaws clasp so tightly the collector's net, that they are with difficulty taken therefrom. As they dart swiftly by, there is nothing to suggest

the bright colours which are now revealed to the eye—a lovely green ornamented with spots of white or yellowish-white. They do not remain long in one spot, and it must be remembered that they are as fleet of foot as they are agile on the wing. Though *Cicindela campestris* (fig. 36) is under three-quarters of an inch long, it is one of the most ferocious of British beetles. So rapacious indeed is it that if two specimens were captured and placed in a box together there would be a battle royal, and in the end it would be a case of the survival of the stronger. They render signal service to the gardener, and this both as perfect insects and as larvæ. Indeed, the cunning the latter display in awaiting their prey with jaws extended at the entrance to their burrows is truly marvellous.

Still keeping to insect friends, we now come to what may be described as the ugliest, the most useful, and the most persecuted of the huge group, in the familiar Devil's Coach-horse, *Ocypus olens*. There is hardly a garden in the kingdom in which this insect is not to be found, and regretfully must it be admitted that there are very few where it receives that protection to which, in the interests of horticulture, it is entitled. There can hardly be any doubt that its very boldness creates enemies, for when molested by man the fearless little creature will elevate its tail and open wide its powerful mandibles, as if to say, "Come on." Of an insect so readily recognised no description is, or at least should be, necessary. It may not, however, be generally known that concealed beneath the short elytra are some powerful wings capable of carrying the insect a long distance in a very short time. Fearless to a degree, it wages war against the largest of insect foes, and invariably proves victorious. *Ocypus olens*, though perhaps the incarnation of beetle ugliness, is an insect which every gardener should welcome and do his best to encourage and preserve.

Two or three other species yet claim the gardener's attention on account of their utility—the familiar Ladybirds, the beautiful Glowworm, and the gloomily clad *Pterostichi*. The Glowworm is of especial interest as being Britain's only light-bearing insect; but its value to the gardener and the farmer lies in the fact that it destroys vast numbers of the destructive snails belonging to the genera *Zonites* and *Helix*, and is strictly carnivorous in its tastes. It is the female which illumines our southern country gardens in summer, and oftener still our waysides, her mate being seldom in evidence except to the entomologist. By the average person the female Glowworm when picked up is not regarded as a beetle, and little wonder when one looks at the soft larviform body quite destitute of wings (Fig. 37 B), in this respect being in direct contrast to the male, which has ample wings and wing-cases (fig. 37 A.) The larvæ, too, which are often unearthed, are also very useful: they differ but little in



FIG. 38.—PTEROSTICHUS MADIDUS.

general appearance from the female perfect insects. At the hinder extremity of the body, however, will be found an apparatus with which the creatures are able to remove the slime from their mouths at the end of their snail-feast—a truly marvellous provision of Nature.

Some of the *Pterostichi* are amongst the commonest garden insects, and they are exclusively carnivorous. *P. madidus*, an insect about three-quarters of an inch long, of a deep shiny black,

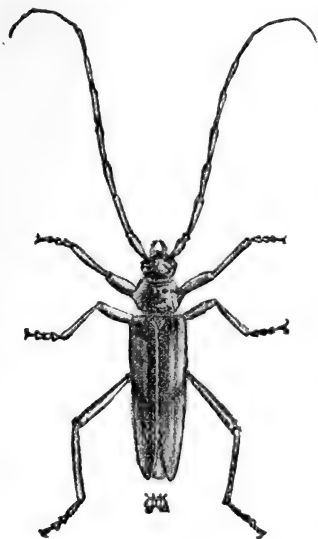


FIG. 39.—MUSK BEETLE
(*Aromia moschata*).

and with ovate wing-cases (fig. 38), is very abundant. Like the *Carabidæ* generally, these insects are night-feeders, and it is only when digging or when removing rubbish that they are brought to light. Another common species is *P. vulgaris*, found under stones. It is a trifle larger than its last named relative, which in all other respects it resembles.

The part the Ladybirds play in clearing our gardens of aphides is fairly well known; but it is much to be feared that the black, slaty-grey larvæ as well as the pupæ are often unwittingly destroyed. The latter of course are inactive, but the larvæ are even more voracious than the perfect insects.

Time will not admit of my enlarging upon the many beetles which the gardener has to confront in the shape of foes. Moreover, these are more familiar than the friends, and their “funny little ways,” are dealt with in most up-to-date horticultural publications. There are one or two, however, about which considerable misconception frequently arises in the minds of the amateur gardener—the wire-worm in particular. Such common and destructive creatures one would naturally think were universally known, but a long connection with a journal dealing largely with gardening matters has shown me that all sorts of animals are confused with the true wire-worms. These are in

reality the larvæ of certain active little beetles popularly known as Skipjacks—*Agriotes sputator*, *A. obscurus*, *A. lineatus*, and *A. hæmorrhoidalis*. They are therefore true insects, and are provided with the orthodox six legs characteristic of the class to which they belong. For all that, one is constantly receiving as wire-worms, millipedes, and even centipedes, both of which belong to the *Myriapoda*. Now, it is very necessary that the gardener should be able to distinguish these latter animals and know the respective part each plays. As a matter of fact the millipedes and the centipedes differ considerably in habit. The former are slow of movement and vegetarians; the latter are extremely

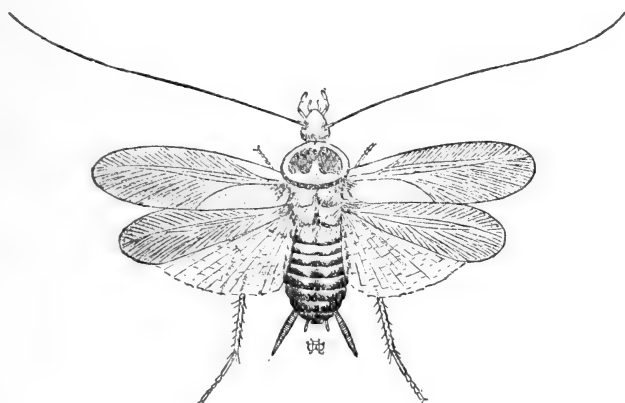


FIG. 40.—*PERIPLANETA AUSTRALASIE*.

active and carnivorous, capturing their prey alive. Both common names are misleading, as neither of the animals possesses the number of legs suggested. One or two of the centipedes common in gardens are also of interest as being amongst the few light-bearing animals in this country. They are frequently mistaken for glowworms.

One is tempted to linger over the peculiar habits of some of the more destructive garden beetles. *Phyllotreta nemorum*, for instance, which in the early part of the season may be found in that common wayside flower, the Shepherd's Purse (*Capsella bursa-pastoris*), and later plays such havoc with the turnip crop; or to extol the beauties of the asparagus beetle (*Cricocoris*

asparagi), with its peculiar cross-like markings; or, yet again, to refer to the length of time the larvæ of the wood-feeding kinds, like the large, graceful, and sweet-smelling Musk-beetle (fig. 39) which affects our willows, and the gigantic Stag-beetle (*Lucanus cervus*), whose formidable mandibles strike terror into the hearts of the timid, remain in that state.

I must, however, pass on to the *Orthoptera*. In this order are to be found the largest of all insects as well as two or three which are amongst the most familiar of those found in gardens—earwigs; while it also includes such omnivorous pests as the cockroaches. The latter in particular call for extended notice

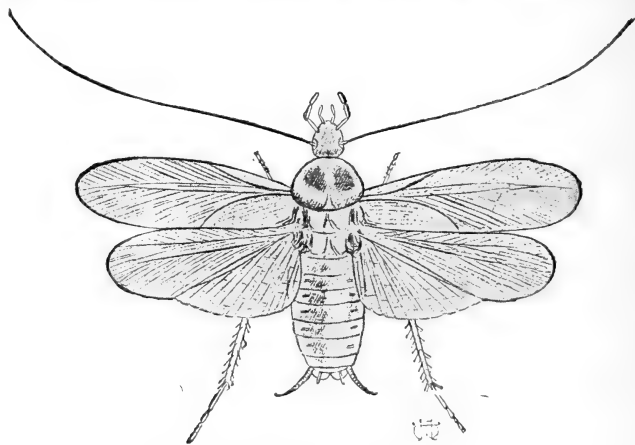


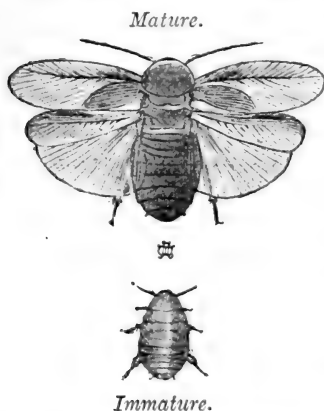
FIG. 41.—*PERIPLANETA AMERICANA*.

by reason of the fact, that despite much vaunted insecticides and traps of every kind, they continue to increase with alarming rapidity. This is true not only as regards the common cockroach (*Periplaneta orientalis*), the much-abused and misnamed "blackbeetle" of our kitchens, but also in respect of three other species, which of recent years have linked their fortunes with man and taken up their abode in his plant-houses. There is scarcely any need to refer to the injuries cockroaches inflict upon the fronds of young ferns, the petals of choice orchids, the shoots of vines, or even upon the bunches of grapes themselves. Rather is it necessary to direct attention to the danger which threatens the gardener from their increase. Even our common cockroach is not a native, though it has been so long with us

now as to be considered naturalised. Like the bed-bug, it is one of those insects with which an interchange of commerce has presented us. At first it was confined to comparatively few districts, but now it has spread over a vast area, and there is scarcely a village home in which the cockroach is not to be found, it having to a great extent supplanted the chirping "merry" cricket. Being night roamers, cockroaches are liable to be overlooked and their depredations to be put down to other causes. Fortunately, contrary to the general rule with regard to insect life, the cockroach takes a long time to arrive at maturity. Instead of a year being required to complete the cycle of existence, some five years are entailed in the process. Being natives of warmer climes, artificial heat is absolutely necessary to their well-being, and this our plant-houses admirably afford. Here the pests can increase in comparative safety, for although it is possible to destroy vast numbers of the insects, to exterminate them is out of the question. This difficulty is not a little due to the way nature has ordained the eggs shall be protected. In common with some *Orthoptera* the cockroaches deposit their eggs in capsules, which are hermetically sealed, and thus defy insecticides and the like.

I should now like to remark upon two of the new-comers—*P. australasiæ* (fig. 40) and *P. americana* (fig. 41). Though in general appearance the former bears some resemblance to *P. orientalis*, yet in many respects it differs materially. First it is somewhat larger and has perfect wings in both sexes, whereas with *P. orientalis* only the males possess them. The colour is a red sienna-brown, with a yellow streak along the costal margin of the forewing at the basal half: the pronotum is almost black, with a yellow margin all round. Despite the specific name, this cockroach does not appear to be a native of Australia. Mr. Dale took it at Sherborne, in Dorsetshire, in 1839, and Mr. MacLachlan noticed it in the *Entomologists' Monthly Magazine* a few years since from Belfast. At Swanmore Park Gardens, Bishop's Waltham, Hants, it is established and does much damage. In the palm-house and in the forcing-pits at Kew, *P. australasiæ* is very common, and is found to attack the young shoots and the axillary buds. Phosphorus paste has, however, proved very effective in destroying them. The insects are very lively in a warm atmosphere, but sluggish in a cool one.

P. americana is again larger than *P. australasica*, and, like that insect, fully winged in both sexes. It has not the yellow mark along the costa, nor the distinct yellow ring round the pronotum, and in general the insect has a more suffused appearance. The cerci are different in shape from those of the last. It is a great nuisance on ships, and is found in most continental ports, while several English ones have also been invaded by it. In the Zoological Gardens, London, it is extremely abundant,



while it has also turned up in Kew Gardens, the Royal Horticultural Society's Gardens, and at Covent Garden Market. Being omnivorous it is always a pest, and, as the specific name implies, it is a native of America (perhaps imported thither from Asia).

Lately one or two specimens of another cosmopolitan cockroach, very dark in colour, have been found. This is *Leucophæa surinamensis* (fig. 42). Two

FIG. 42.—*LEUCOPHÆA SURINAMENSIS*.

had previously been taken at Bognor, probably imported in

oananas, and it appears to be breeding at Kew. Coming to the earwigs, we have at once some of the best known, the most graceful, and the most interesting of British insects. That they inflict considerable injury upon certain plants there can be little doubt; but that they are not as bad as they are usually painted I am firmly convinced. The fact is they are not strict vegetarians, and will frequently forsake the petals of flowers and the interior of fruits for a diet of larvæ or small snails. Though not wishing to defend the marauding propensities of the little insects, yet it is hardly fair to speak of their failings, and leave their good deeds unrecorded. Two species are common here—*Forficula auricularia*, which is ubiquitous, and *Labiæ minor*. The other five species are very scarce. Especial interest centres around earwigs from the fact that they are the only insects which take any care of the eggs when laid. They even go to the extent of removing them to a

place of safety should danger threaten, and of "brooding" them. Earwigs are remarkable, too, on account of their possessing forceps at the hinder extremity of the body. These vary considerably in the case of the male, though they are never straight; but they are very constant in the case of the female, being always straight, with hooked tips. The exact purpose of these forceps is not known. In some species (winged) they assist in replacing the exquisitely folded wings; but in others (wingless kinds) they may be useful as weapons of defence. Few people seem to credit the common earwig with the possession of the wings, which are neatly folded under the tegmina, and which are seldom used in flight except perhaps in the autumn; nor would many recognise the smaller *Labia minor* when on the wing.

The *Neuroptera* constitute an order of insects which, as far as Britain is concerned, contains not a single individual which is hurtful in gardens; while at the same time it includes some of the greatest friends the gardener has in the genera *Chrysopa* and *Hemerobius*. Nor must the much-dreaded Dragonflies be lost sight of, for they are decidedly beneficial insects. Though chiefly found in those gardens where there are ornamental waters, yet they will hawk for their prey some distance from the stream which gave them birth. Of the *Chryopides* (Lacewing-Flies, Golden Eyes, or Stink-Flies), there are some fifteen species in this country; but only two or three are at all common in gardens. These are, however, so eminently useful that not one gardener or farmer who values his crops can afford to ignore their great services. Delicate though they look, they are voracious to a degree, and destroy as perfect insects and larvæ myriads of aphides. They are readily distinguished by their conspicuous golden eyes, long slender antennæ and gauzy wings—some beautiful shade of green—the beautiful colours, however, which one sees soon fade when the insect is dead, as is the case with dragonflies. Once seen they can hardly be confused with anything else. Lacewing-Flies often find their way into houses, and windows afford them special attraction, while they may be found in abundance upon palings. The eggs are extremely curious, and should always be protected; they are fairly conspicuous, being laid singly at the end of long stalks, but several in a group. The larvæ are not unlike those of ladybirds. Some of them clothe themselves with the skins of their victims after the manner

of certain of the *Hemerobides*. These latter insects are less readily recognised than the Lacewing-Flies, but are none the less true friends. They are smaller than the *Chrysopides*, and not so strikingly coloured.

Dragonflies assist in preserving Nature's balance by devouring butterflies, moths, &c. On any bright day in summer these creatures of the sun may be found hawking for prey. Of the larger species, the body only of the moth, butterfly, or what not is eaten, the wings being allowed to fall to the ground. To that abundant pest, the Silver Y-Moth, the dragonflies seem very partial, as also to the equally troublesome craneflies, and I have frequently taken dragonflies with these insects in their jaws. The *Odonata* have not been studied in this country with half the zeal that has been bestowed upon some other and less interesting families, though one enthusiastic naturalist, Mr. W. J. Lucas, is about to give to the world the benefit of his labours in that direction.

Hymenoptera.—The insects comprised in this order have strong claims upon the gardener's attention by reason of the part they play in the fertilisation of his flowers; while the intelligence displayed by ants, bees, and wasps is not equalled by any other insect. Then, too, the order includes the ichneumon flies and the sawflies—the one working for the gardener's good, and the other to his certain loss. To separate the sheep from the goats in so vast an order is somewhat difficult, as now and again there is a very fine boundary line. Take the case of the Social wasps, of which there are seven species in this country. That they confer a benefit upon the gardener by destroying the larvæ of certain noxious insects no one will dispute; but this benefit is nullified by the injuries they inflict upon the fruit crops. This, at any rate, holds good in respect of six out of the seven species found here. The hornet (*Vespa crabro*) is the exception, for though occasionally taking toll of fruit, it practically subsists upon caterpillars, while it does not hesitate to attack and devour other Social wasps. From the other Social wasps it may be distinguished by its much larger size and deeper yellow markings on a brown (not a black) ground.

The other section of the family, the Solitary wasps, are insects deserving of protection, as they render incalculable service. They are frequently found in gardens, and may be seen on

umbelliferous and other flowers diligently searching for larvæ. These they sting, so as to render them insensible, and then carry off to the hole in which they have decided their family shall be reared. The food having been collected, the eggs are laid therein, and the entrance to the nest is sealed, the mother-wasp taking no further trouble with it. In due time the larvæ are hatched out, eat of the food ready to hand, and become pupæ, emerging the next season to commence again the cycle of existence. To distinguish between these Sand-wasps (*Odyneri*) and the Social wasps is comparatively easy. The body, which in all wasps is more or less pear-shaped, is markedly so in the case of the *Odyneri*, and has been aptly likened by Mr. Butler to a "peg-top" surmounted by a polo cap which is too small for it. A still further distinction lies in the tarsal hooks, which are simple in the Social, and hooked in the Solitary wasps. These latter obtrude their presence upon man by making a nest under his very nose. In one instance known to me, a female solitary wasp had the temerity to take up her abode on the frame of a blackboard, which was constantly in use in a schoolroom, bringing larvæ to her quarters in the way characteristic of the insects.

It is hardly necessary to refer to the part bees play in the garden, and I will pass on to the consideration of the ants. Are these insects injurious or otherwise in the garden? is a question often asked. One naturally hesitates to condemn as injurious insects possessed of such a high degree of intelligence as the ants. Yet it is impossible to shut one's eyes to the fact that, besides making unsightly heaps in garden paths and elsewhere, they give encouragement to the honey-dew-secreting aphides, and these destroy not only the shoots, by sucking the very life from them, but, by closing the pores by their sticky secretion and their excrement, prevent the leaves from exercising their proper functions. And on these scores alone ants, much as we admire their industry, must be condemned.

We now come to the parasitic *Hymenoptera*, which are of immense value to the gardener, though they seldom receive any credit. Were it not, however, for these parasites the gardener's troubles would be increased forty-fold. Every boy who has collected butterflies is familiar with the ichneumonid larvæ and pupæ which in certain seasons he meets with more than in others. The ichneumon flies responsible for this, belong to the group now

under notice. One of the most useful is *Apanteles glomeratus*, which is of such service in keeping in check those pests of our kitchen gardens, the Cabbage Whites. This, however, is but one of a mighty army working unseen in man's best interests. The yellowish cocoons of the ichneumon flies should never be disturbed by the gardener, as in the course of time they will hatch out into flies, and these in their turn commence anew the cycle of existence. The flies themselves would not be recognised, but by preserving the cocoons he is certainly doing the best he can for his crops. Popularly it is supposed that the eggs of the parasite are deposited in the butterfly or other larvæ, and these afterwards are literally eaten alive. Nothing, however, could be more erroneous. The "ichneumonised" larvæ do not apparently feel any ill effects from the visitors until they are about to pupate, when they usually sicken and die, although occasionally perfect insects will emerge from pupæ so infested. What really takes place is that the host-caterpillar continues to feed, even more voraciously than ever, but the juices it absorbs are intercepted by the parasites.

Sawflies, again, though so very destructive and so very numerous, are kept in check by these parasitic *Hymenoptera*.

Again, the aid rendered by the Ichneumon flies to the fruit-grower is almost incredible; for some fifty or more species attack that pest, the Winter Moth (*Cheimatobia brumata*). Everyone therefore who has fruit under cultivation should be ready to acknowledge the services of the harmless-looking parasitic *Hymenoptera*.

Lepidoptera.—This is the best known of all the orders of insects, containing as it does the very familiar butterflies, the beautiful if little-known hawk-moths, and the moths proper. From the first named the gardener suffers but little; for if we except the Whites not one of the other sixty odd species give him any trouble. This is the more remarkable seeing that such species as the Peacock, the Small Tortoise-shell, Red Admiral, Painted Lady, Brimstone, one or two of the Blues, Small Copper, &c., are fairly constant visitors to our gardens. And practically the same may be said of the hawk-moths. Of the other moths so numerous are the foes that to remark upon even a tithe of them would fill a volume or two. Quite a large number of the larvæ—for the perfect insects of all moths and butterflies are harmless—take

toll of the fruit; another section preys upon vegetables; and yet others affect flowering plants. The most destructive are amongst the smallest—Tortrices, or Leaf Rollers, not one of which exceeds an inch in the stretch of the wings. They are moreover the most difficult to deal with, feeding as they do in the tube-like retreats which they construct in such an ingenious manner, and which has given rise to the appropriate name bestowed upon the group. From insecticides they are fairly safe, while they do not run the same chance of being detected by the insectivorous birds. Two of the most destructive, taken all round, are the Codlin Moth and the Plum Moth. As moths, nearly all the group are short-lived, and flying as they do in early morning or at dusk they are not often seen except by entomologists.

Diptera.—Very few insects of this order, the members of which are characterised by possessing only one pair of wings, exert any important influence in the garden. The larvæ of the Crane-flies (the tough Leather-jackets) and the Onion-flies are perhaps the most generally known and most injurious. Of late years, however, another species has been causing the apple-grower some anxiety. This is *Trypeta pomonella*, whose caterpillars feed upon the pulp of the fruit. The perfect insects closely approach the house-flies, but possess very prominent eyes of a most brilliant colour. Turning to friends, there are none more useful than the Hawk-flies (*Syrphus*), whose lovely hues and bright yellow spots are very distinct. The larvæ feed upon aphides, and are frequently found upon rose bushes and chrysanthemums. They taper considerably towards the head, but have a blunt and widish hinder extremity. Their method of progress is somewhat curious, and has been aptly likened to the movement of the leeches of our ditches. As soon as the grubs are full-fed they attach themselves by their tails to the food-plant, using a kind of sticky secretion for the purpose. Thus the pupal stage is passed, and the perfect insects quickly emerge. Such larvæ as are found should never be interfered with, as they are amongst the most voracious of all aphid-feeding insects.

Hemiptera.—In this order the members are characterised by possessing a beak-like mouth, consisting of four sharp stylets, by means of which the juices of plants are extracted. The order is again subdivided into *Heteroptera* and *Homoptera* purely on the structure of the wings. So far as the gardener is concerned

the first sub-order is of no consequence ; but the second forces itself upon his attention by reason of the fact that it contains some of the most injurious pests in the whole range of insects. To it belong the destructive Aphides and the Scale insects, the disgusting-looking Cuckoo Spit insect, and the little-known, so far as this country is concerned, Grape Phylloxera. The Aphides, or plant-lice, are undoubtedly the most remarkable of the whole order, alike as regards their numbers (200 species are known here), destructive propensities, the variety of food-plants laid under contribution, and their exceedingly omnivorous tastes. This last characteristic does not appear to be as well known to the majority of amateurs as it should be, and comparatively few recognise in *Aphis pruni*, that pest of fruit-growers (for it is not only a honey-dew secreting kind, but one which feeds curled up in the leaves), the insect which at another season is working havoc with certain *Compositæ* like Asters and Chrysanthemums. This is, however, but one example out of many. Again, the enormous rate at which plant-lice increase, almost invariably puzzles the average gardener, who is not alive to the fact that besides males and females there are asexual individuals which are viviparous. Moreover these latter for several generations produce others of the same kind. Of the Woolly Aphis, or American Blight, little need be said ; and so, too, of the Grape Phylloxera, though the life-histories of both should prove interesting to every gardener.

Closely allied to the Aphides are the Scale insects, with many of which fruit-growers at any rate are very familiar. Their life-history, too, is a very remarkable one. The males are two-winged (sometimes wingless) flies, but by even the closest observers they are seldom seen. They are quite incapable of inflicting any injury upon plants. The females, on the other hand, are very destructive and fairly conspicuous—at least those commonly met with in gardens. Having been fertilised, or in certain cases without the intervention of the male, they deposit eggs, and die. With some, the scale-like bodies which were formed during their larval life, either from an exudation of the body or the cast skins, serve as coverings for the eggs. Other of the Scales exude cottony particles like some Aphides, and the Currant Scale (*Pulvinaria ribesiæ*) is one such. These white particles are very common on Black and Red Currants in summer.

With the notice of the *Hemiptera* is concluded my necessarily brief notes upon garden insects. Throughout friends rather than foes have been touched upon for reasons adduced at the outset. My object has been to stimulate the interest of the gardener in the host of insects which come so readily to hand, so that he may to some extent distinguish between those which are helpful and those which are injurious, and thus tend to preserve that delicate balance in Nature which is so desirable.

THE TREATMENT OF INSECTS AND FUNGI IN THE UNITED STATES.

By S. C. LAMB, F.R.H.S., California.

REMEDIES FOR INSECTS AND FUNGI.

It is very important that every one who has the care of a garden, orchard, or field should have a clear idea of the remedies available for preventing the injuries due to insects and fungi. Not only should we know how to make and apply the remedies, but it is just as important to know when, and when not, to apply. Mistakes are often being made, and the following are some of the most common :—

1. Remedies are often used when there is no need whatever for treatment, and when there is nothing to destroy.

2. Applications are very often wrongly timed, either before any good could possibly be produced, or else after the injury has been done.

3. Often the wrong kind of cure is used, and therefore no good result is procured.

4. Applications are often made for troubles for which there is no known practical method of treatment.

5. Expensive methods are often employed when cheaper ones would accomplish the same results—cheaper as regards materials used and labour employed.

Mistakes of judgment in this as in other operations will cause much loss of time and labour, but they are clearly mistakes of ignorance, and why should this be allowed to be the cause of making the cost nearly twice as great? It is the aim of the

writer to attempt in a brief compass to show the most important points to be considered in the treatment of plants.

But it should be distinctly recognised that local experience, and experiment, are the only real guides to a successful result.

CLASSES OF PESTS.

Almost all the serious pests that attack plants are insects or fungi. We can take them in order as they attack a plant.

1. *Root-feeding Insects*, which attack the roots of plants. They may devour the roots, suck the sap, or cause swellings to form, and the same insect may even attack the plants above ground as well as at the roots.

2. *Boring Insects*, which live within the plant, and mostly attack the stem or trunk, but also bore the leaves and fruit.

3. *Sap-sucking Insects*, which attack the upper part of the plant, boring in the leaves and stems to obtain their food. They resemble those that suck the sap from the roots, but the last are a much more difficult economic problem.

4. *Defoliating Insects*, which eat up the leaves and other green parts of plants.

5. *External Fungi*, growing over and living upon the exposed parts of the leaves and stems of plants, and only sending feeding suckers into the plants.

6. *Local Fungi*, which enter the plant, but remain at the point where they found an entrance, and only spread by the spores being carried to other parts of the plant, and there growing into it again.

7. *Penetrating Fungi*, which have the power of passing from one part of a plant to another by boring their way through the plant. Each of the classes of pests must be treated in a different way, and usually the remedy for one would be entirely useless if applied for a pest of another class.

INSECTS.

Root-feeding Insects.—Fortunately the number under this class is not many, for there is no remedy known, that is practical for general use, by which they can be treated. It is not because the insects are hard to kill, but because the nature of the soil is such that it is very difficult to reach them. The best of the known processes—the use of carbon bisulphide—is not certainly

effectual unless used in such quantities as to destroy the roots of the plants at the same time, and this is practically useless, except for disinfecting the soils. The very exhaustive and unsuccessful experiments made with the phylloxera, especially in France, make it appear doubtful if anything will ever be found in the way of treatment for root insects. For annual crops, the most promising methods at present known are crop rotation, starvation, and trapping.

Boring Insects.—About the only thing that can be done for boring insects is to prevent their entrance into the plant. This may be done by mechanical means, by covering the threatened parts with something that will either prevent the egg-laying or form a barrier to the young insect. Thus the use of cylinders of wire mosquito net, an inch or two larger than the trunk of the tree. Borers may also be prevented entrance by coating the part of the plant liable to attack with some poison, which will be eaten by the young borer as it attempts to burrow into the plant. A good coating is a paint composed of glue made green with "Paris green." For green parts of trees, Paris green with water, applied often to keep the parts well poisoned, will be found a good destroyer. After the insect has once entered the tree there does not appear to be any sure cure.*

Sap-sucking Insects.—In this category are included some of the easiest as well as some of the most difficult insects to destroy, but they can all be treated successfully as far as we know. It may be often that the cure will be too expensive to be practical. This would apply generally to field crops, where the cost per acre for treatment is greater than the saving that can ensue from the application. The insects of this class are not affected by poisons like Paris green, because they get their food by inserting their beak into the plant; nothing, therefore, on the surface of the leaves will have any particular effect. The only feasible plan, therefore, is to spray on them some caustic or oily substance, or to envelop them with some poisonous gas. Plant lice are ordinarily very easy to kill, but protected insects, like the scale insects, or very active ones, like the so-called grape thrips, are far more awkward to deal with. The latter are probably best

* The maggot or grub that bores in apple and pear trees may be easily detected by the excreta thrown out by the insect at the orifice it entered by. If a pliable piece of copper wire is inserted with a little force the grub is generally killed, and the branch or tree is but little the worse.—ED.

treated by causing them to leap or fly against a "hopper doser" of some form. A hopper doser consists of a surface of tin, or other material, covered with printer's ink, tar, or some other sticky substance, which holds the insects captive that touch it.

Defoliating Insects.—The insects eating the leaves of plants are, as a rule, the easiest insects to destroy, and at the least expense, because the leaves may be covered with relatively cheap poisonous substances; and as the insects eat the leaf they will also consume the poison, and thus end their existence. Only the more valuable field crops can be treated economically, however, for even as cheap a process as this is too expensive for most of the staple crops. Insects of the defoliating class can also be killed by the same remedies used for sap-sucking forms; but with those remedies, as is true of the insects of the former class, the insect must actually be touched by the remedy to be affected by it.

FUNGI.

External Fungi.—One can easily, with the aid of a small microscope, see the threads of the fungus. All parts of the plant above ground are affected, but the young leaves and the ends of stems are most readily attacked. They may be destroyed, and the spread of the fungus stopped, by the use of the vapour of sulphur.

Local Fungi.—Most of the rusts and spot fungi may be classed under this head. They live within the plant, and so cannot be destroyed after they once gain an entrance. A cure, therefore, is impossible, and attention must be turned to preventing their entrance. The spores are produced very abundantly and quickly in most species, so that, if treatment is not given soon after the first appearance of the trouble, it will be seen to spread with great rapidity, and involve a much larger part of the plant. The theory of treatment is to keep the plant covered with some substance which will prevent the germination or sprouting of the spores, thus preventing the fungus from entering a new part of the plant. We now know a number of very effectual substances which will produce this result.

Penetrating Fungi.—This is the most difficult group of fungi we have to deal with. Grain smuts, blackberry rust, and curl-leaf of the peach are examples. In annual plants the infection

usually occurs at about the time the seed sprouts, so that the destruction of the spores that may be on the seed is often sufficient to ensure practical immunity. In perennials the only thing usually to be done is the removal and destruction of the infested plants. Some diseases of trees due to these fungi may possibly be controlled by preventing the spread of the disease (by spores), by the use of the remedies that are so effectual against the local fungi, and by vigorous pruning and removing of new growth, in which the disease is chiefly carried over from one season to another. This is, at least at present, the most promising line of experiment in these cases. The experience in some parts of California with curl-leaf, where it seems to be entirely controllable, would seem to indicate that the disease is not, in every region, to be properly classed with these penetrating fungi. Further study may show that in certain seasons or in certain regions the disease may arise from a local, and in others from a penetrating fungus, and so in one place be easily controlled, and in another not at all controllable without the destruction of the plants affected.

REMEDIES.

There are a great many substances that may be used successfully against insects and fungi; but we recommend only a small list, selected because of their effectiveness and cheapness. Remedies are applied as a dry powder, as a gas, or as a fluid, spray or wash, the great majority being in the latter form.

POWDERS.

The most common way of applying powders is the "pepper-box" method, in which the material is carried in a vessel provided with perforations, through which it sifts as the vessel is shaken over the plant. A modification of this, much used in the cotton fields of the Southern States, consists of bags of the material suspended from the ends of a pole long enough to reach from one row of cotton to the next. This is carried by a man riding on a mule, and the jar causes the powder to sift through. Cloth is chosen for this purpose, which is fine enough to allow only the right quantity to be distributed. A third method, much used in this country, is a blowing device, which is very satisfactory for field use, and does very rapid work.

Only three remedies are recommended to be used in the dry form, and these have a rather limited use.

Air-slaked Lime.—This is the powder resulting from the exposure of ordinary lime to the action of the air for some time. It is only recommended as a remedy against insects which have a slimy coating over the body. For these it is a cheap and effectual remedy. It is not as cheap, however, as Paris green, but is particularly recommended where the latter is objectionable because of its poisonous nature. For true slugs, which are not insects, but have a similar slimy coat, it is the best remedy we know of; but it must be applied in the evening or early morning, while the animals are on the plants; and may have to be repeated two or three nights in succession to kill all. Except in gardens it may not pay to make more than one application, which will, if rightly timed, destroy most of the slugs.

Sulphur.—This is a widely used remedy for the mildew, which is so common on plants in California. The powder is usually applied by the pepper-box method. It only becomes effectual as the heat of the sun vaporises it; the field thus treated smells strongly of the sulphur during the warmer part of the day, when the vapour is being produced. On wet cloudy days, when the mildew is growing and spreading rapidly, the sulphur is inert, but the first bright day makes it effective. It may be possible to artificially vaporise the sulphur on a large scale for use in such weather; but no attempt has yet been carefully made, except in greenhouses, and then with the best of results. The vapour of sulphur must be used, and not the gas produced by burning, which is very injurious to foliage. Sulphur has been found to be a successful remedy for the so-called red spider, also called yellow mite—animals somewhat related to the true insects. Fairly good results are also reported in its use against the thrip. For these purposes the sulphur is used in the same way as for mildew.

Paris Green or London Purple.—(For a general account of their action, see under *Sprays*.) These two arsenical poisons are occasionally used in a dry form, but chiefly suspended in water as a spray. They are used for the same purposes in either form. A common practice is to dilute the poison with flour, dust, or other powder so that it can be more easily and evenly distri-

buted. If not so diluted, care must be taken not to apply it so thickly in places as to endanger the foliage.

GAS TREATMENTS.

Gases have the property of diffusing themselves with great rapidity, so that when applied in a closed space every part of that space will in a short time contain some of the gas. Thus no other method of killing insects is calculated to be as thorough in its work. But in an open space this property of diffusing destroys, to a great extent, its utility. Sulphur applied as a powder, as has already been stated, is not effective until it becomes a vapour; and then the dissipation is not as much as with most gases, because of the weight of sulphur vapour and the fact that it is applied over whole fields at once. The impracticability of enclosing most cultivated plants, and the cost of the treatment, both in time and chemicals, makes the method useful to only a very limited extent. We recommend but two gases.

Carbon Bisulphide.—This substance is not available for plants in active growth, and is chiefly useful for stored products, such as seeds and grains. It can be used for disinfecting soils and ridding other articles of insects. In disinfecting soils an injector is used. A number of forms of the latter are on the market in Europe, where phylloxera eradication has required them. It is doubtful if this method of soil disinfection would be profitable in the United States for the destruction of any insect. For destroying insects in seeds or grain, carbon bisulphide is a very cheap and satisfactory means. The bin or box containing the seeds to be disinfected should be tight, at least at the sides and below. A dish is placed on top of the material to be treated, and a quantity of the carbon bisulphide poured in. It evaporates rapidly, and the vapour, being heavier than the air, sinks into the lower part of the bin. The top should be covered also, in order that the vapour may remain a long time in the grain. Very rarely will bins be perfectly tight, so that the exact amount necessary cannot be stated. Usually the estimate is made at one pound to the ton of grain, which is sufficient for a fairly tight bin. Grape vine cuttings are most successfully disinfected in a similar way, by placing a saucerful of the bisulphide on the cuttings in a tight box, and leaving for forty minutes. The yellow

jacket, our common wasp, which is so injurious to fruit, and which makes its nest in the ground, is easily killed by this substance. The nest is located, and about dark, when the wasps are all in, about an ounce of carbon bisulphide is poured down the hole, and a handful of earth thrown over it to keep the vapour in. By morning all will be found to be dead. Ants' nests can be destroyed in the same way. Carbon bisulphide is also one of the best remedies for gophers. If used in the fall, after the rains have begun (so that the ground is not too porous), an ounce poured over a rag and stuffed into a hole and covered with earth will destroy the inmates.

Hydrocyanic Acid Gas.—This is practically the only acid which is strong enough to kill the insects on a tree with safety to the leaves, and within [a short time enough to make its use practical on a large scale. Its work is very effectual and satisfactory, but it is very expensive, and, therefore, is only available for the more profitable trees, such as the *citrus* varieties. It may also be used for disinfecting. The gas is extremely poisonous, and, sometimes, for reasons not entirely understood, is very injurious to the foliage; but the injury is almost all prevented by its use at night. The process is to cover the tree with a tent of sail-cloth, oiled to make it tight, and in a vessel beneath the tent the chemicals which make the gas are placed. After half an hour the tent is removed and put over the next tree. The chemicals needed for every 100 cubic feet are $\frac{1}{3}$ ounce of potassium cyanide, $\frac{2}{3}$ ounce of water, and $\frac{1}{3}$ ounce of sulphuric acid. The common practice in California is to use it decidedly stronger for small trees and weaker for the largest trees. In the smaller trees it is safe to use it stronger, as the small amount of gas used is very quickly diffused. When it is produced in large quantity, as is necessary for a large tree, some of the gas, scarcely at all mixed with air, may come in contact with the leaves and injure them. The practice probably arose, in part, from some tables which have been published widely in California, where the contents of the tent was calculated by multiplying the height of the tree by its breadth. The practice is not justifiable, and if the weaker amount is successful there is no reason for not using the same proportion on smaller trees.

There are many kinds of tents used, and many plans for changing them from tree to tree, the details of which we cannot

give here. The tent is usually of an octangular shape, and is furnished with rings for hoisting. The largest tents require a derrick for lifting them into place. The following are the amounts of cyanide of potash to be used for trees of varying heights :—

Amount of cyanide of potash	Height of Tree.	
	If as broad as high (Navel oranges, &c.)	If $\frac{2}{3}$ as broad as high (Seedling oranges, &c.)
$\frac{1}{2}$ ounce	6 feet	8 feet
1 "	8 "	10 "
2 ounces.	10 "	12 "
4 "	12 "	15 "
8 "	15 "	20 "
1 pound	19 "	28 "

SPRAYS OR WASHES.

The most important remedies for plant pests are applied as a spray or wash. By the word "wash" one would naturally understand a more copious application than a spray, but in ordinary usage the terms are identical. For very low plants an outfit working on the principle of a sprinkling-can will do ; but for better and more economical work, and work on higher plants, some form of force pump and spray nozzle is necessary. There are many forms of pumps on the market that are good for the purpose. A spray pump should maintain a fairly constant and sufficient pressure, and its valves and general construction should be simple and its parts easily replaceable. The nozzle should, for most spraying work, be such as to break up the stream into a fine mist ; but for scale insects one giving a stream of considerable force is desirable. The shape of the spray is usually either conical or fan-shaped, and each has its particular advantage for a particular class of work. The construction of the nozzle should be such as to permit of easy, quick, and thorough cleaning. A few forms, designed to clean themselves automatically, work well. In most spraying the object is to get the largest possible proportion of the spray to remain on the leaf or stem, and to have it well distributed. This is best accomplished by covering the leaf with minute globules like dew. As soon as they run together and drip from the leaf the distribution is not

perfect, and there is actually less left on the leaves. When the nozzle is held as far from the plant as the stream will carry, the full effect of the nozzle is obtained in the breaking up of the stream into mist, and so can produce most perfectly this dew-like condition. For scale insects the object is somewhat different. The plan for these is to thoroughly wet the surface of the bark and the edges of the scale, to ensure the penetration of the wash beneath the scale, and thus to kill the old scale or the eggs and young hidden beneath. This thorough wetting is secured by holding the nozzle close to the plant and applying a great deal of the wash with a high pressure. Washes are sometimes applied hot; and when the nozzle is held close to the plant the spray will penetrate better, and for this reason do better work. Heat is to be recommended as a remedy only when it can be absolutely controlled.

Grain Smut.—The method of treating seed wheat and oats for smut is as follows:—For wheat, soak fifteen minutes in water at 132° F.; for oats, ten minutes. The grain should be first placed in water at, say, 115° to partly warm it up. See that the grain is all wetted, and do not treat too much at a time, or it will be impossible to keep the water at the proper temperature. Have boiling and hot water at hand so as to add, to keep the temperature just right. It must not go above 135° or it may injure the seed, nor below 130° or it will not be effective. After treating, dip in cold water to cool and spread out to dry.

Bordeaux Mixture.—This is the most used and the most satisfactory of the known washes for prevention of fungoid attacks. When sprayed upon the plant it prevents the development of the spores of any fungi upon the surface covered; and it is thus a perfect preventive of all the fungi which gain an entrance to the plant in this way. To be effective it must be kept continuously on the plant that is to be protected. A single spraying will last from two weeks to a month, or even longer if the conditions are favourable. With our dry summers one application will often be found enough for some kinds of fungi. Late spring rains may make additional sprayings necessary; and some fungi may, in some localities, require the repeated sprayings necessary in a more humid climate. Local experience will have to determine these points. Bordeaux mixture is made of equal parts of bluestone (copper sulphate) and lime. Some formulas

give six parts of bluestone to four parts of lime, which will do if the lime is good. Slake the lime, and dissolve the bluestone separately. Both should be cold when they are mixed, and the resultant mixture will be a beautiful blue wash. If mixed hot, a black compound (copper oxide) is produced, which reduces the value of the wash. As to the amount of water, we recommend, for ordinary spraying, 1 lb. of each of the above to ten gallons of mixture, and for winter use 1 lb. of each for four gallons.

Ammoniacal Copper Carbonate.—This solution is very effectual, but is not as lasting as the Bordeaux mixture. It is a perfect solution, and therefore has no tendency to clog the nozzle (as is the case with the Bordeaux mixture), and can be used on fruit near the picking season and on ornamental plants, which would be disfigured with the lime wash. The usual way of making this wash is to dissolve copper carbonate in ammonia and then dilute. If the carbonate is not fully dissolved before the water is added it cannot be further dissolved, and not only is the carbonate wasted but the fluid will not be up to the standard strength. It is well, therefore, to give the ammonia ample time to act, say over night, before adding the water. The proportions are 1 oz. of the copper carbonate in 10 oz. of ammonia for every ten gallons of spray. Another way of producing the mixture is to mix solutions of bluestone and sal soda, dissolving the carbonate of copper thus produced in ammonia, and diluting with water. The bluestone and the sal soda should be mixed in about the proportion of three to four, after having been dissolved separately in a small quantity of warm water and cooled before mixing. Three ounces of bluestone with four of sal soda and twenty of ammonia is sufficient for twenty gallons of spray.

Lime, Salt, and Sulphur Mixture.—This wash is useful both as an insecticide and a fungicide, but only for winter use on deciduous trees. It is usually made by boiling the sulphur for one hour and a half, with about one-fourth of the lime, in a covered kettle with enough water to cover well; then the rest of the lime and the salt are added, and the boiling continued half an hour longer. The proportions are about 6 lbs. of lime, 2 of salt, and 3 of sulphur for sixty gallons.

Resin Soap.—The cheapest insecticide which kills by contact is resin soap. It is for scale insects, and so has good penetrating power. Like all insecticides killing by contact, the effect of the

spray is soon gone, and it only kills the insects which are wet with its spray. It is generally applied warm. In making the soap the ingredients are placed in a closed kettle with enough water to cover, and are boiled for two hours, when all will be united into a soap. In diluting, only a little water should be added at a time, and stirred in ; or, better, hot water should be used, because of the danger of chilling the soap and causing it to harden, when it is almost impossible to dissolve it again. The proportions are 8 lbs. of resin, 2 lbs. of standard caustic soda, and one pint of fish oil for 40 gallons, for use on trees in foliage,* and the same for 25 gallons to 30 gallons for winter use.

Kerosene.—There has recently been placed on the market a device for mixing kerosene with water in the pump as it is being applied, and with very good results. Full directions as to proportions accompany the device, and we will here only discuss the precautions to be observed. These are, chiefly, the use of a nozzle capable of producing a very fine mist, and applying the spray so that the drops do not run together, *i.e.*, holding the nozzle as far as possible from the plant, and not applying too much. Pure kerosene has great penetrating power, perhaps the greatest of all the insecticides, and, with the above precautions, can be safely used.

Kerosene Emulsion.—While not as cheap as resin soap, kerosene emulsion is easier to make, and, in small quantities or where the conveniences for boiling are not at hand, is the most satisfactory remedy. Like resin soap this spray kills by contact. The ordinary form of the emulsion is something of an art, to be properly manufactured. The ingredients are two parts of kerosene to one of sour milk or of strong soap solution. The latter must be made boiling hot and added to the kerosene, and the whole pumped through a spray nozzle for fifteen minutes. After pumping a few minutes, the whole mass will become beautifully creamy and apparently perfectly emulsified ; but if a little is placed in water it will be seen that some of the kerosene separates out and rises to the surface. When the emulsion is perfect there will be no separation when diluted. If the soap is of poor quality or the water is hard, more soap must be used ; and, on the other hand, if both are good, not as much is needed as

* It is very doubtful whether in England 2 lbs. of caustic soda to 40 gallons of water is not too strong a mixture for trees in leaf.—ED.

recommended below, which is intended to suit the average condition. The proportions are : Three ounces of soap in three pints of water or sour milk, and three quarts of kerosene for ten gallons of emulsion for scale insects, or for fifteen gallons for plant lice. Another formula, which is easier made but more expensive, and so only recommended for use on a small scale, consists of using eight times as much soap. When so made the creamy mixture described above, obtained within five minutes, is a permanent emulsion.

Paris Green and London Purple.—These poisons kill only those insects that eat the leaves covered by them, and are useless against sucking insects like plant lice and scales. They are also useless against overwhelming numbers of insects, such as swarms of grasshoppers, which are able to eat up the plant before getting poison enough to kill them. Arsenic is the active principle in both these poisons, and is about equally strong in both. Paris green is copper arsenite, and London purple an arsenite of lime containing an aniline residue, to which the purple colour is due. The latter is a finer powder and remains better suspended in water, but the Paris green is, as a rule, safer to apply. Both poisons, if applied too strong, will burn the foliage, and both require constant stirring or the material will settle to the bottom, and so not be uniformly distributed. For the best results the poison should not be allowed to drip from the tree, and the finer the spray the better. These poisons do not as a rule remain any great length of time on the plant, but must be renewed every two or three weeks, or while the danger of insect attack exists. In mixing the poison it is well to first make a paste with a little water and then dilute, as otherwise it is difficult to wet the leaves with it. The amount used is about 1 lb. to 200 gallons of water.*

The following table is intended to give, at a glance and in a small compass, the ingredients, proportions, and method of preparation of various washes. For convenience they are calculated in per cents. for metric calculations, while the amounts necessary for five and forty gallons respectively (as representing an oil-can and barrel) are given in the common weights and measures.

* In England 1 oz. to 20 gallons of water is sufficient. We have known trees seriously damaged by the application of 1 oz. to 10 gallons. N.B.—Trees should never be sprayed whilst in bloom.—Ed.

Name	Strength desired	Ingredients	Per cent.	For 5 gallons (oil-can)	For 40 gallons (barrel)	Directions for mixing
Bordeaux mixture	Usual strength.	{ Bluestone	1.25	$\frac{1}{2}$ lb.	4 lbs.	{ Dissolve and shake separately; do not mix while warm.
	Extra strong for winter use .	{ Lime	1.25	$\frac{1}{2}$ "	4 "	
		{ Bluestone	3.00	$1\frac{1}{2}$ "	10 "	
		{ Lime	3.00	$1\frac{1}{2}$ "	10 "	
Ammonia cop- per carbon- ate	Usual strength.	{ Copper Carbonate .	.08	$\frac{1}{2}$ oz.	$\frac{1}{4}$ "	{ Do not dilute till clear.
	Usual strength.	{ Ammonia . . . . .	.80	5 "	$2\frac{1}{2}$ pts.
		{ Bluestone . . . . .	.12	3 "	6 ozs.
		{ Sal Soda . . . . .	.16	1 "	$\frac{1}{2}$ lb.
Lime salt and sulphur . .	For winter use only.	{ Ammonia80	5 "	$2\frac{1}{2}$ pts.	{ Do not dilute till clear.
		{ Lime	9.00	$3\frac{1}{2}$ lbs.	26 lbs.	
		{ Salt	3.00	$1\frac{1}{2}$ "	10 "	
		{ Sulphur	4.50	$1\frac{1}{2}$ "	13 "	
Resin soap.	Usual strength.	{ Resin	2.40	1 "	8 "	{ Boil two hours.
		{ Caustic Soda . . .	.60	$\frac{1}{4}$ "	2 "
		{ Fish Oil . . . . .	.30	2 ozs.	1 pt.
		{ Resin	4.00	$1\frac{1}{2}$ lbs.	12 lbs.	
Kerosene emulsion	Extra strong for winter use .	{ Caustic Soda . . .	1.00	$\frac{1}{2}$ ozs.	3 "	{ Boil two hours; dilute with warm water.
		{ Fish Oil . . . . .	.50	3 "	$1\frac{1}{2}$ pts.
		{ Soap or sour milk {	Sp. .15	1 "	$\frac{1}{2}$ lb.	
		{ Kerosene	Mk. 2.50	1 pt.	1 gal.	
Paris green or London purple	Weak for plant lice	{ Soap or sour milk {	Sp. .25	2 "	2 "	{ Mix hot, with spray pump, fifteen mins. Use either sour milk or a soap solution.
		{ Kerosene	Mk. 4.00	$1\frac{1}{2}$ ozs.	$\frac{3}{4}$ lb.	
		{ Soap or sour milk {	Sp. .80	$1\frac{1}{2}$ pts.	$1\frac{1}{2}$ gals.	
		{ Kerosene	8.00	3 "	3 "	
	Usual strength.	{ Soap	2.00	$\frac{3}{4}$ lb.	6 lbs.	{ Mix five minutes.
		{ Kerosene	8.00	3 pts.	3 gals.	
		{ Soap	12.00	$\frac{3}{4}$ ozs.	6 ozs.	
		{ Kerosene	12.00	6 ozs.	6 ozs.	

CROSS-FERTILISATION OF FLORISTS' FLOWERS.

By Mr. JAMES DOUGLAS.

[Read August 10, 1897.]

THIS is one of the most important matters connected with gardening, for by cross-fertilisation all the beautiful Auriculas, Carnations, Pinks, Gladioli, &c., have been produced; although until quite recent years the importance of the subject has not been recognised, nor has any record, that I am aware of, been kept, of the first attempt at hybridisation of any of our florists' flowers, which in every case must have preceded cross-fertilisation.

The selection of varieties, from seed of the original wild parent, is a very slow process indeed, and but little would be accomplished in a life-time in this way. Of course there are exceptions. The Shirley Poppies, for instance, were produced by selecting the most beautiful varieties in each year from a sport of the original wild poppy of the fields, and in a very few years the Rev. W. Wilks brought up to one of our meetings the beautiful but fugacious flowers known as the Shirley Poppies.

On the other hand, take the garden Cineraria, well known as one of the most showy of spring flowers for greenhouse culture. I have grown the supposed original parent for four seasons, and have kept the plants isolated so that no pollen from any other Cineraria could touch the flowers; seed has been saved, seedlings raised and flowered annually, but there is not yet any appreciable variation from the original *C. cruenta*. In passing, I might mention that it is much more difficult to obtain seed from *C. cruenta* than it is to save it from the garden varieties. The plant was figured in the "Bot. Mag." about a hundred years ago, and the editor remarks that its seeds usually prove abortive. But if the plant when in flower is fertilised with pollen from the garden varieties, seed is produced more freely, and the prepotency of the pollen parent is evident in the progeny, which comprises many beautiful forms more like the pollen than the seed parent. The question has not been determined whether the garden varieties of the Cineraria have been obtained directly from *C. cruenta* by selection, or whether they have been obtained by cross-fertilisation with some other species. Some incline to one

view, some to the other ; I suspect cross-fertilising by some other nearly-allied species gave the first varietal forms.

The *Gladiolus* is another favourite garden flower which has been much improved by cross-fertilisation. The late Dean Herbert published a book on bulbs just sixty years ago, and therein gives an interesting account of his efforts in cross-fertilising the *Gladiolus*. He made many crosses with distinct species, which he has recorded in his book, but he did not advise his readers to rest there. He says : " It is not, however, by crossing different species, or local varieties of plants only, that the cultivator may add to the beauty of his collection. Much may be done, undoubtedly, by crossing judiciously the finest seminal varieties of such plants as have already been improved in our gardens, and are disposed to break into a multiplicity of forms and colours." Dean Herbert is undoubtedly right. It is by first hybridising nearly-allied species, and then by saving seeds from the progeny and selecting from the plants resulting therefrom, that our garden favourites have been so greatly improved. Whenever variation has once been obtained, cross-fertilisation may be proceeded with to obtain further garden varieties.

It is thus that so much of beauty has been obtained in the Carnation and other garden flowers by amateurs who make one particular flower their study, and perseveringly work upon it year after year, not disheartened by failure nor unduly elated by success. I may be allowed to allude to the Rev. F. D. Horner as an *Auricula* specialist, Mr. Martin R. Smith as a lover of Carnations, and the Rev. G. H. Engleheart who has taken such infinite pains with the *Narcissus*. These gentlemen, and others like them, have, by years of perseverance, accomplished each a work that may last for generations yet unborn.

I know something of the Carnation myself, and have watched the progress made by Mr. Martin R. Smith, in his garden at Hayes. There is an accurate record kept of the result of all the various crosses, and much knowledge of a permanent kind has thus been treasured up for future use.

The old florists did good work in their days. Take the Carnation, for instance. I find it is stated in Rea's "*Flora*," published in 1676, that many fine varieties had already gone out of existence or had been pushed aside for new and improved varieties. Rea enumerates 360 varieties of Carnations in culti-

vation 221 years ago. These, of course, have long since passed away, having been replaced by other and doubtless improved forms produced by florists, who have left us the results of their work, but have given us no indication whatever as to how it was done. But we have evidence that quite as good varieties of the Show or Flaked Carnation were in existence 110 years ago as we have in our gardens now. There is a plate of Franklin's 'Tartar' published in Curtis's "Bot. Mag." in 1787. I showed this coloured figure to Mr. B. Simonite of Sheffield, the leading northern raiser and grower of this class of Carnations, and he was compelled to admit that no finer variety of this class was now in existence.

Mr. Martin R. Smith has informed me that he has learned from his own work at Hayes that the pollen parent has more influence in giving colour and form to the resultant seedling than has the seed parent. He says, "The prepotency of the pollen parent is beyond doubt," although I observed, in looking over his numerous experiments, that it was not invariably so, as will be seen from the two following tables, which I have drawn up from his notes and records. My own experience is somewhat similar; and I have come to the conclusion that not only in the Carnation, but in all other florists' flowers, we must choose as a seed-bearer a plant with good habit, sound and vigorous constitution, and the variety from which the pollen is taken should possess flowers of fine form and of decided colours, all the better, of course, if the plant possesses a good habit and sound constitution also.

In sending the notes from which the tables on pages 208 and 209 have been compiled Mr. Martin Smith writes:—"They are the result of observations since 1892, but I fear they are of a very negative character. Unfortunately the evidence on one side, viz., the prepotency of the female parent, must always be tainted by suspicion, for if the characteristics of the male parent are entirely absent it is so easy to urge that 'the cross was not a true one.' I can only say that we take the greatest care. We keep all bees out of the houses and never mark a cross as 'sure' unless the flower collapses within the proper time. When my records began, however, we were not so careful as we are now, and the bees had access to the flowers; thus a cross may have given evidence of its being 'sure' by the collapse of the bloom, but we had no

assurance that a bee might not have done the work five minutes before we fertilised the bloom. Taking, however, the general average I am certain that the great preponderance of flowers crossed and marked as 'sure' are really so, the evidence being often given by the habit and foliage when not apparent in the flowers of the produce. One very strong bit of evidence in favour of your theory is given by the crosses on 'Germania.' Now Germania is a flower of tremendous *individuality*, and if any flower in existence could transmit its peculiarities to its descendants it would be Germania; and yet you will find that Germania is swamped by the individuality of the pollen parent in the great majority of cases. I hardly ever get a yellow from Germania

TABLE I.—SHOWING PREPONDERANCE OF MALE PARENT.

Seed parent	Pollen parent	Remarks on produce
Germania . . .	Sir B. Seymour . .	All the produce took after male parent.
" . . .	A maroon	Nearly all the produce maroon.
" . . .	Marnie Murray (scarlet)	4 out of 5 were white.
" . . .	Golden Rain (yellow ground fancy) . .	Produce took after the male.
" . . .	Mrs. Vernon Har- court	5 scarlets, 1 maroon.
" . . .	Abigail (rose) . . .	Rose, apricot, or buff barred with rose.
" . . .	Ariadne	Produces scarlet, crimson, and rose.
" . . .	Madame A. Waroc- que (Malmaison) .	Produce buffs and some rose.
" . . .	Pink Malmaison . .	Yellow not represented exc. by buffs and buff ground fancies, produce giving every variety of scarlet, crimson, and rose.
" . . .	Several purples . .	Produce mainly maroon, and white.
Sigurd (buff) . .	Germania	4 yellow, 2 buff, and 1 white.
Remembrance . .	"	All yellow ground picotees and fancies.
Audrey Campbell	Lady Gwendoline . .	1 white, 1 rose, 1 scarlet.
The Beau (buff) .	Germania	4 yellow, 2 buff.
Alice Ayres . . .	"	1 yellow buff.
Winifred (buff) .	Rose Wynne (crim- son maroon) . . .	Produce mainly maroon.
Almira	Pink Malmaison . .	4 pink, 1 yellow ground picotee.
Warocque	Almira	Nearly all buff, flaked and barred with crimson.
Scarlet seedling .	Duke of Orleans . .	2 yellow, 1 buff, 1 crimson.
Corunna (yellow)	Hayes' Scarlet . .	2 white, 1 scarlet.

TABLE II.—DOUBTFUL OR SHOWING PREPONDERANCE OF FEMALE PARENT.

Seed parent	Pollen parent	Remarks on produce
Germania . . .	King of Scarlets . .	2 yellow ground picotees, 1 yellow self.
Hayes' Scarlet .	Duke of Orleans . .	2 white, 2 scarlet. No yellows or buffs.
Ruby	Germania	2 rose. No trace of yellow.
Lord Sefton (crim. fl. maroon)	„	4 white, 1 maroon, 3 yellow or buff.
Governor . . .	„	1 yellow, 1 buff, 2 rose, 1 crimson.
Madame Van Houtte	„	All took clearly after the mother.
Ella Murray (maroon fl. crim.)	„	8 all following mother. No trace of father.
Tournament . .	Pink Malmaison . .	4 yellow ground fancies, 1 rose self.
Countess of Jersey	Hayes' Scarlet . .	4 yellow ground fancies.
Abigail	Germania	2 white, 1 pink, 2 apricot, 1 yellow ground picotee.
Spy (white) . .	Mephisto	3 white, 2 rose.
Warocque . . .	Germania	Every sort of colour, the nearest approach to yellow being buffs, self or flaked, and crimson. Almost all take after mother, and all very vigorous except those showing trace of father, such as apricots, buffs, &c., which are distinctly of weaker constitution.
Agnes Chambers	Abigail (rose) . . .	2 yellow grd. picotees or fancies.
Ariadne (chaundy)	Germania	3 scarlet, 3 rose. No trace of father.
G. C. Murray (scarlet) . . .	„	4 white, 9 all colours, but not one with trace of father.
Mrs. Muir . . .	Warocque	3 white, one of them blush.
Favourite (pic.)	Germania	6, not one with a trace of father.
„ . . .	Hayes' Scarlet . .	4 white ground picotees, and 1 white self. No trace of father.
Mephisto . . .	Germania	1 purple, 2 dark maroon, 2 buff, 1 blush white.
Favourite (pic.)	King of Scarlets . .	2 picotees.
Rose Wynne, crim. maroon .	Germania	4 maroon selfs. No trace of father.
Corunna	Port Light (scarlet)	3 yellow, 1 scarlet.

worth having. I get plenty, but when I do I find them, as a rule, pure reproductions on a most feeble scale of the mother, and I always regard them as products of Germania self-fertilised, and not a true cross."

The Auricula is a flower that I have carefully cultivated and crossed with the intention of producing seedlings superior to the parents ; but I must confess that no better opportunity could be afforded to anyone who keenly desires to practise patience than by attempting to raise Show Auriculas.

The Show Auricula, as some of you are aware, is divided into four classes—viz., Green-edge, Grey-edge, White-edge, and Sells. The Green-edge has the margin of the corolla green, without any spot or symptom of farina. Next to this margin of green is a ring or band of dark maroon ; some are almost black. The centre is white, caused by a very dense coating of white farina ; and the mouth of the corolla is a bright deep yellow. The Auricula fancier knows the points of his flower, and if desirous of producing a new variety with a green edge, he takes the two best he can get and cross-fertilises them. The process is first to remove the anthers from the intended seed-bearer before the pollen cases burst. After two or three days the pollen should be carried on a small brush, and placed on the stigmatic part of the intended seed-bearer. This is done three days in succession, and generally a cross is effected. The young and ardent florist may fancy he is to have a fine lot of Green-edged Auriculas, but if his expectations are high they will soon have a fall. Not one in ten will have a pure green edge, and if he gets a really good one out of 500 seedlings he may rest and be thankful ; and that he may not be too overjoyed at even this limited success, it may be as well to add that a good seedling will not always retain its first promise of high-class quality, but often sadly degenerates after the first year's bloom. On one occasion, some twenty-five years ago, I cross-fertilised a fine Grey-edged Auricula, 'George Lightbody,' with pollen from 'Smiling Beauty,' a fine white- or grey-edged variety. There were about 1,000 seedlings flowered from this attempt. I saved about half-a-dozen promising varieties for further trial, but they had to be discarded one after another until only one remained ; but it is still cultivated by amateurs under the name of 'Silvia.' Some years afterwards I made another successful cross with the best green-edged forms, and after a very nearly similar weeding-out, I produced 'Abbe Liszt,' which is considered one of the best green-edged varieties.

Of course, the seedling-raiser of any type of florists' flower

must have a standard of excellence before him, and the qualities or points he aims at must be in the parents; in both, if possible, but certainly in the pollen parent. Those intending to begin the culture of any florists' flower, and wishing to produce seedlings, will find the points of quality faithfully described in a recent publication of this Society entitled "Rules for Judging."

Another point I would like to bring forward, and, if possible, would like to have some discussion upon, is whether there is a point beyond which we can no further go. I not only believe there is, but bring some evidence in support of my contention. There is a picture of a bizarre Carnation taken by Sydenham Edwards 110 years ago; and the leading grower and raiser of this class of Carnation assures me that it is not yet surpassed. The Grey-edged Auricula 'George Lightbody' was raised from cross-fertilised seed fifty or sixty years ago, and cultivators north and south have been trying ever since to raise a better grey-edge, but have not succeeded in so doing. I do not for one moment allege that we can go no further in *any* direction with either Carnations or Auriculas. For in Self and Fancy Carnations, and Yellow-ground Picotees, there is still much to be done before any flower can be named perfection; but in some directions, notably in those I have mentioned, it almost seems as if we could not advance further. All the more reason that we should branch out in new directions, and continue to work on steadily and perseveringly in those directions where improvement is manifestly still possible.

It is not altogether easy work, for, besides the difficulty in raising new varieties better than the old, there are so many insect pests and fungoid diseases which must be fought and conquered. Our Carnations have the wire-worm boring the stem below ground, and the maggot above ground. Fungoid diseases, in winter of one kind, and another species in summer. The Auriculas have the woolly aphis, which is more than enough, and the Hollyhock is decimated year after year by a horrible fungus which attacks the leaves, and follows the plant everywhere. I verily believe if Hollyhock seed was taken and sown in Nova Zembla or in Patagonia the *Puccinia malvacearum* would be found ready waiting to attack the plants. But nothing daunts the enthusiastic amateur or the real lover of plants; his failures or successes are but stepping-stones to the point upon

which he has set his mind, and his motto is *Labor omnia vincit*.

DISCUSSION.

Dr. MASTERS, F.R.S., drew attention to the coincidence that at the very time when Mr. Douglas was reading his paper a statue was being unveiled at Shrewsbury to the memory of Charles Darwin, and reminded the meeting of the great value and importance of the experiments and investigations with regard to the fertilisations of plants which Mr. Darwin had made. Darwin, he said, had been one of the first to point out the significance attending the slightest variations observed in plants, and he placed great emphasis on the fact that they were none of them the outcome of mere whim or caprice, but afforded evidence of the greatest possible value to students inquiring into the laws of design, environment, &c., as they affected plant life.

Mr. A. DEAN advised using seedlings from Germania as pollen parents in crossing Germania, as he fancied that a better Germania could only be obtained by either self-fertilisation or by crossing with its own produce, or possibly with some other good yellow.

Mr. COLVILLE BROWN stated that he had raised a great many seedling carnations from Italian seed, which all produced single flowers the first season of flowering, but that many of these became semi-double the next season, and quite double the next.

Mr. JENKINS, referring to the supposed prepotency of the pollen parent, said that he had crossed two of the best white flowers, and the seed so obtained produced flowers of almost all colours, even some scarlets among them.

Mr. DOUGLAS, replying, mentioned that "Purple Emperor" was obtained from two white wire-edged picotees which had been crossed with a view of getting white ground picotees. He also said that for a single-flowering carnation to develop into a double one, was quite the *vice versa* of his experience.

THE PLUM.

By Mr. A. H. PEARSON, F.R.H.S.

[Read August 24, 1897.]

I do not intend to say much about the origin of our cultivated plums, as this must be, in a great measure, a matter of conjecture. Some of the plums we cultivate are sub-species. Our Bullace is the *Prunus insititia* of botanists, and our Damson doubtless originates from the same source; our Cherry plum is the *Prunus myrobalana*, and there are several varieties, such as the Early Mirabelle, St. Etienne, Queen of Mirabelles, and Rivers' Early Prolific, which are of the same race. It is the generally received opinion that the bulk of our varieties have sprung from *Prunus domestica*, but I think we may take it that the blood of more than one species is found in the plums which we cultivate to-day, for we find that varieties closely resembling one another in every respect, demand different stocks for their well-being when propagated by grafting.

The plum is one of the most valuable of our hardy fruits, and, if well managed, one of the most profitable to grow; it will thrive in almost any soil, and one finds plum-orchards producing fine crops of fruit upon strong clay, and also upon light gravels, chalk, and even sand; so that the range of soils upon which plums may be planted is an extremely wide one. Time will not allow me to speak of the best aspect and conditions for planting plums; suffice it to say that although they bloom early and are benefited by shelter from cold east winds, and enjoy a good aspect as well as any other fruit tree, they are not so very particular in this respect, and even so far north as Clydesdale we find that the orchards planted on a northern slope are said to succeed better than those with a southern exposure. Plums rejoice in a moist soil, but will not thrive in a wet undrained situation; indeed, all fruit trees are impatient of stagnant water in the soil. The demand for plums is very great, and when this fruit is in the market most others are at a discount. Much has been written and said about over-production and glutted markets; so far as my experience extends there is always a market for *good* fruit, and this remark applies to plums quite as strongly as to apples and

other fruits. Of course the plum is a perishable fruit, and cannot be stored, but I hope to show that by careful management such losses as we sometimes hear of may be avoided; certainly so long as our continental neighbours are kind enough to make us an annual present (by bounties) of some £2,000,000 to take their production of sugar, we ought to be able to make jams at such a cheap rate as to secure us a monopoly in the markets of the world.

PROPAGATION.—The natural method of propagation is by seed, and this is, of course, the only way in which new varieties can be obtained. We have not a very complete record of the raisers of the varieties of plums which are at present in cultivation; some of them were raised generations ago, when but comparatively little interest was taken in these matters, and many more have been introduced from abroad. The home of most of the new varieties raised in this country is Sawbridgeworth, and Mr. Rivers has raised and distributed more than perhaps any other person. No list of good plums could be made without including such varieties as the Czar, Monarch, Early Transparent, and Early Prolific; all of which, with many others, were raised at Sawbridgeworth. America has furnished us with several valuable varieties, of which I need only mention Jefferson (Judge Bush), and Denniston's superb (Isaac Denniston), to show our indebtedness to that country. Coe's Golden Drop (Jervaise Coe), was raised at Bury St. Edmunds, Kirke's Plum (Jos. Kirke) at Brompton, and Diamond (Hooker) in Kent; the bulk of the Gages seem to have originated in France. Most varieties were doubtless chance seedlings; in the days of our grandfathers planters seemed to think it was cheaper to raise seedlings than to buy trees, and many of our old orchards in this country abound in seedlings both of plums and apples (especially the latter), and from out of this chaos there would doubtless emerge from time to time some novelty worthy of propagation. To-day one does not think of raising seedlings except with the view of obtaining new varieties, for although some sorts, such as Green Gage, reproduce themselves fairly true from seed, the bulk of seedlings would be greatly inferior to existing varieties, and as they are more vigorous in their growth than grafted trees, they would be longer in coming into bearing. A second method of raising young trees is by planting suckers; the plum, being a surface-

rooting tree, is naturally inclined to throw up suckers, and this habit is taken advantage of by market growers in various parts of the country, for instance, in the Vale of Evesham the "Persnore" Plum is almost always raised from suckers, as is the "Johnny Roe" in Nottinghamshire, and the Damson in Cheshire. Trees grown in this way are greatly inferior to worked trees, they are difficult to form into shapely specimens, and the tendency to throw up suckers is increased by this method of propagation; they are also longer in coming into bearing. Mr. Rivers says that "Rivers' Early Prolific," when raised from suckers, does not bloom for several years, whereas worked trees bloom the second year. In the market gardens of Nottinghamshire one often finds huge trees of Mussel and Brussels Plums, which have been taken as suckers from trees worked upon these stocks, and which are really only cumber-grounds, as the fruit is of little value.

The best method of propagation is by budding or grafting; the former is preferable as the union of the stock and bud is closer and more natural than that of a graft, and in the case of plums, not so liable to cause gumming. With respect to the stocks used for working, one finds that in many nurseries, both in this country and on the Continent, two or at most three stocks do duty for all the varieties of plums grown, whereas in other nurseries six kinds of stocks are used, viz., the Common Plum, the Brussels, the Mussel, the Brompton, the Damas Noir or St. Julien, and the Myrobalan; the origin of some of these stocks is unknown, but that they are of different races would seem apparent from the fact that some cultivated varieties prefer one, some another, whilst a few are acceptable to nearly all, and it seems to me that the secret of success is to work the stock with a variety which is of common parentage, or which at least has the same blood in it. Let me explain my meaning by an illustration. Nearly all plums will grow upon the Common Plum stock, although some of them thrive much better upon other stocks. "Prince Engelbert" and "Black Diamond," both large dark plums, succeed well upon the Mussel stock, whereas upon the Brompton they grow for a while and then part company at the graft; the union never seems complete. "Dove Bank," on the other hand, flourishes upon both Brompton and Brussels, but will not grow upon the Mussel. "Belgian Purple" will not grow upon either Brussels

or Common Plum, but flourishes upon Damas Noir, Mussel, or Myrobalan. This brings me back to the idea previously thrown out, that our cultivated plums cannot be all of common descent, or they would probably all thrive upon the same stock. To many people this subject of stocks may seem a matter of small moment, but it is one which frequently carries results that are far from pleasing. For example, an acquaintance of mine bought 250 damsons for planting in the North of England; they proved to be worked upon a stock which is not hardy in the north, and although they were fine trees, they were killed by a severe winter, two years after planting. My father once purchased a number of damsons, worked upon the Mussel stock, and, although they appeared to be good trees, they all dwindled away year by year and had to be replanted. I will not go further into detail, but it must be obvious that this is a matter of importance, and it is one which in some quarters has been much neglected by propagators. Before leaving this subject I may just say that the one stock needed by all cultivators is a real dwarfing stock, which, for the plum, would correspond with the "Quince" for pears, and the "Paradise" for apples; such a stock is yet undiscovered, and is much to be desired; of course some of the stocks I have named will carry trees of much more vigorous habit than others, and the intelligent nurseryman does not dream of using the same stock for his trained wall and espalier trees as that which he uses for standard trees; at the same time the difference is not so great as we could wish, and a really dwarfing stock would be a great boon.

Budding is done about July, when the bark will run readily from the stock and the buds are sufficiently ripe. I need not go into the detail of the operation, as everyone is conversant with it, but I may say in passing that no matter how well the buds are put in, unless they are properly tied afterwards and a wrap of the tying material passed just above the bud, so as to properly hold together the lips of the incision on the stock, the result will be failure. If buds are inserted too early they will in all probability make growth the same season (which is undesirable), and if inserted too late there is great difficulty in getting them in properly, and very few will grow; what is needed is just a sufficient movement of sap to permit of the bark running freely and to nourish the newly inserted bud, without exciting it into growth.

In a showery season, when the stocks are swelling after budding, care must be taken to loosen the ties before they cut into the stock, but they should not be removed altogether, or the buds, being dormant, will be thrust out. This is often a cause of serious loss; the ties should be taken off and replaced, wrapping and tying lightly.

GRAFTING is done in the spring, and, as a rule with propagators, is only made use of to make good the failure amongst stocks which were budded the preceding summer; of course, where it is desirable to re-work trees of some age, grafting is the means to employ, but the plum does not lend itself to this operation like the pear and apple, and the results are seldom satisfactory.

I may just say whilst upon the subject of grafting, that I have searched a good many authorities upon this question, and they almost all recommend that the cuttings to be used as grafts should be in as dormant a state as possible; most of them say that they should be cut off in December or January, and taken care of until required. With one exception, which I will give, the whole of the authorities, both new and old, that I have consulted, are agreed upon this point—dormant they must be. But does this well-received statement rest upon any solid foundation? For fifty years we have discarded it at Chilwell, and my foreman (who has been with us forty-two years) tells me that his predecessor always took his cuttings as he was ready for them, excepting of course in seasons when the weather was very mild and buds began to develop too much, in which case he cut them off, and buried them in a cool place for a few days, but never for more than a week, or at the outside a fortnight, before grafting. Again, one reads that when it is necessary to rework old trees, the stocks should be headed back early in the winter to prevent the movement of the sap; this is manifestly absurd, as the end of the branches so cut back would dry up, and it would be impossible to insert grafts unless they were again cut back some 12 inches to get fresh wood. I was so much impressed with the constantly reiterated advice to have one's grafts in a dormant state, that I made the experiment one year of having them cut off a month before they were required, and laid in damp sand until the time for grafting; unfortunately, like some other experimentalists, I started on a large scale, and the result was most disastrous;

we had the worst failure that we have ever known with the prepared grafts, whereas those taken in the usual way were as good as need be. I have already said I found one exception to the advocates for early cutting and retarding grafts; in M. Edward Pynaert's book, "*L'Amateur du Fruit*," he quotes from the writings of M. Carrière, a Belgian amateur, to the effect that contrary to the usual practice he never cuts his grafts until the moment when he wishes to use them, and the only case in which he would use grafts, other than freshly cut, is when one receives them at a time when it is not possible to use them immediately, or when the work has unavoidably to be done very late. It is needless to state that this question of dormant grafts applies to all kinds of fruit trees which are usually propagated by grafting.

Passing from the subject of propagation to that of planting and subsequent management, we find that as a rule plums succeed best when grown in an unrestricted form; they are impatient of close pruning, under which treatment they frequently gum, consequently most market growers plant them as bushes or half-standards, and after cutting back the shoots for a couple of years, so as to form well-balanced trees, they leave them, so far as pruning is concerned, severely alone. In our gardens we frequently see closely-pruned pyramids, but rarely do these carry fruit, for the plum, being somewhat rampant in its growth, when closely pruned makes strong shoots at the expense of fruit buds; the only remedy is to lift trees which are required for pyramids several times whilst young, and thus check the root action and throw them into bearing, and under this treatment and with a favourable climate the finest quality of fruit can be grown. From the Trent to the Lowlands of Scotland all the best varieties of plums require and deserve a wall to bring them to perfection; many of our old gardens are provided with fine walls, and a few are covered with fine trees, but in the majority of old gardens which it has been my lot to see, the wall trees (more especially in the case of plums) can only by courtesy be called *trained* trees. It is true that the stems are fastened in some way to the wall, but the spurs are so far away as to be almost outside any beneficial effect of the radiated heat therefrom, and, as a rule, if the wall be of moderate height the lower half of the tree upon it is devoid of spurs, and the larger part of the whole tree is above the wall altogether. I have seen wires placed above the

wall and the shoots trained thereon carrying an excellent crop of fruit, but one could scarcely call this "wall fruit." The reason of this state of things is, first, the naturally strong growth of the plum; and, secondly, the method of training. This is usually the "fan" system, in which the shoots are trained at a natural angle to the stem of the tree, and which, consequently, permits the sap to follow its natural course of rushing up into the leading shoots; this can easily be obviated by adopting the "horizontal" method of training, which by laying the shoots at right angles to the stem of the tree checks the flow of the sap and causes them to make fruit spurs; this system has also the great advantages of covering the wall from base to summit, instead of wasting the lower portion, and of disposing the branches at equal distances from each other over their whole length instead of being overcrowded at their base, as in the case of fan-trained trees. Being the first propagator to recommend and distribute horizontally-trained plum trees, I would say that they are in every way as well adapted for this form of culture as the pear or apple, and just as it is now quite the exception to find these latter trained for walls or espaliers in any other way than horizontally, so I believe in the near future will it be quite the exception to find a fan-trained plum. It will occur to everyone that these remarks upon training apply with special force to those walls which are of a medium height, say 7 to 10 feet, but they also apply to higher walls, inasmuch as a large proportion of the space is wasted when it has nothing upon it but naked stems; it will also be apparent that the so-called horizontally-trained trees which are grown in France, and which some cultivators have adopted in this country, which have their branches trained at an angle of some 45° from the stem, do not check the flow of sap, and thus cause fertility, in the way that training at right angles to the stem does, and that beyond the fact of their branches being equidistant at all parts, they have no advantages over fan-trained trees. I may say in passing that the pruning of the side shoots upon trained trees is better done with the finger and thumb, in the way of pinching young growths, than by the subsequent use of the knife.

It is not possible in a paper like the present to go fully into the details of pruning, training, and management of the plum, but I have selected a few points which I conceived to be of

interest, mainly from the fact that they differ in some measure from the usually accepted methods. I will therefore break off here, and say a few words about the habits of certain varieties and on general management. Plums are, as a rule, very prolific, and the heaviest cropping varieties have the habit of carrying enormous crops every alternate year, thus causing an over-abundant supply one season and a dearth the next; fortunately this does not always occur over the whole country at the same time, or the result would be serious, still this habit has to a certain extent deterred market-growers from planting this fruit as extensively as they otherwise would have done. It is generally said that spring frost is the cause of these frequent failures, but it is undoubtedly often the result of over-exhaustion from the excessive crop carried the previous year; and when by any natural cause the crop is reduced by one half, the trees will carry fruit the succeeding year without taking a season's rest. Many people are fully aware of this fact, and yet but few, comparatively, make any use of their knowledge. A market-grower in my neighbourhood told me some time ago that for many years he had thinned all the fruit on his plum trees, and that he never did anything which paid him so well. He commenced one season when the trees were so laden that the branches resembled ropes of onions, and removed more than half the fruit just before the stones began to harden; this green fruit he took to market, and it was eagerly bought up for cooking and preserving; the money he realised well repaid his labour. Then when the fruit was ripe, and the market was "glutted" with undersized, ill-coloured fruit, the hucksters actually quarrelled to obtain his fine well-coloured fruit, and pulled his baskets out of the carts before he could unload—this bears out my statement that there is always a market for *good* fruit. Furthermore he said that the following year his neighbours just over the hedge had their ill-developed and half-starved bloom destroyed by frost, whilst his came through the ordeal in safety, and he had quite enough left to give an excellent crop. I quote this to show what may be done on a large scale, and of course such practice is even still more applicable to private gardens; no doubt very many gardeners regularly thin their fruit in the manner indicated, but, alas, one's observation compels one to say that many more never attempt it. Before leaving the subject of market-growers, and

that nightmare called "glutted markets," I would just point out that one cause of glutted markets is to be found in the fact that planters have confined themselves too much to one or two varieties of plums. In the Midlands and South of Scotland I should say that ninety *Victorias* are planted as against ten of any other variety, with the result that the fruit often makes a poor price, whilst a week or so before and after *Victorias* are in the market, plums sell well. Again much may be done to improve the *quality* of the fruit grown, both by thinning, as already mentioned, and also by feeding the trees, when they have a full crop, with mulchings of manure. I would suggest also the feasibility of establishing, close to the fruit-grounds, jam-making factories (either by individual or co-operative enterprise), where, favoured with our cheap sugar, the surplus fruit could be utilised and subsequently sold at a profit, instead of being rushed off to London and sold at such a price as will not cover cost of transport and agents' commission. These factories have been successfully established in many districts, and will doubtless extend in course of time. Fruit-pulp is also made and sold by auction. In March last, at Lenham, near Maidstone, amongst other prices realised, damson pulp made 40s. a ton, *Victoria* plum up to 87s. 6d., greengage 50s., raspberry £19, and black currant £45.

In giving a few descriptions of plums and their habits, it must of course be understood that I speak of them as they demean themselves in the Midlands, for some varieties which fail with us are most valuable in the more favoured Southern counties. It would be out of place to attempt a catalogue, and I shall only mention briefly our leading varieties. The heaviest croppers and those most usually selected for market planting are *Rivers' Early Prolific*, *The Czar*, *Victoria*, *Diamond*, *Prince Englebert*, and *Monarch*. *Rivers' Early* is perhaps the most profitable of any plum (where it will succeed), from the fact of its early season, and also that there are so many soils and situations where it is quite useless to plant it. The other varieties named are all heavy bearers, and will flourish in almost any soil. In addition to these, *Caledonian* or *Goliath*, *Mrs. Gisborne*, *Pond's Seedling*, and *Sultan* are all reliable culinary varieties, succeeding well as standards. *Orleans* and *Cox's Emperor* are heavy bearers, but liable to crack in wet seasons; they do best

on warm soils; Prince of Wales, which belongs to the same family, we have long discarded from its being so tender: in severe winters both old and young trees are often killed. White Magnum Bonum is a fine fruit, and in some localities a good orchard plum, but with us it does not produce a crop oftener than every third year upon an average. Johnny Roe, previously mentioned, is a large, coarse, reddish-purple plum of poor quality; but, being a great cropper, is largely grown in Nottinghamshire; the fruit is sent off to the "Black Country," where possibly they have nothing better.

Our best dessert plums in the open are Jefferson, Early Transparent, and Dove Bank. Jefferson is one of the best all-round plums we possess, and many growers would name Dove Bank as a suitable companion; the *Fruit Manual* and other authorities say that this variety is synonymous with Caledonian—as they say Sharpe's Emperor is synonymous with Victoria—the reason of this is that they have not seen the true variety, and even to-day many cultivators supply Caledonian for Dove Bank. The true variety was grown and distributed by Spencer, of Ilkeston, the raiser of "Spencer's Favourite" apple, and is said to have been found growing on the banks of the Derbyshire Dove; it differs from Caledonian in growth, and whereas the leaf-glands of that variety are well developed and red in colour, Dove Bank has small ill-developed glands of a pale colour; with regard to the fruit there is no comparison between the two. Caledonian is a somewhat coarse cooking plum, Dove Bank is a splendid cooking plum, and good enough for dessert. Sharpe's Emperor, just referred to, is a second-rate plum, resembling Victoria in appearance, but very inferior in point of cropping and quality, a decided clingstone, often gumming at the stone, and ripening a fortnight later than its supposed synonym, not worthy of cultivation. Early Transparent is a most abundant cropper, and does well in all forms. Green Gage succeeds best where some chalk is present in the soil; in most parts of the Midlands it carries a good crop in the open once in six years.

I see in a recent work upon fruits the name of Washington plum amongst the culinary varieties, and the same thing occurs in the report of the Plum Congress, Edinburgh, 1889. This must surely be a mistake, for when this variety favours us with a crop it is most delicious. I am quite unable to say how often

it crops in the open, but I have known a very large tree in one of our orchards for thirty years, and only once has it been my pleasure to taste the fruit from it; one year in the seventies it was full, and I spent most of an afternoon in its shade; my foreman says it also bore a crop about the time I was in short clothes, but with these two exceptions it has been resting, so that one may expect it to attain a vigorous old age.

In the craze which has prevailed of late years for everything large in the way of fruit, some of the smaller varieties have been somewhat overlooked. I think of this class *St. Etienne*, *Queen of Mirabelles*, and *Wine Sour*, are well worthy of notice. The two former are pretty little yellow plums ripening in July and early August, very acceptable for dessert, and most delicious as bottled fruit. *Wine Sour*, as all connoisseurs know, is without a rival for preserving.

The plums I have hitherto named all succeed as standards in the open, although many of them are well worthy of a position on a wall, but those usually selected for walls are as follows: *Coe's Golden Drop*, which is perhaps our best plum for this mode of culture, closely followed in point of merit by *Denniston's Superb*, *Kirke's*, and *Jefferson*, all of which are of the highest quality and heavy bearers; *Early Transparent Gage* is also most fertile and of good flavour; *Green Gage*, *Bryanston*, *Reine Claude de Bavay*, and *Reine Claude Violette*, are all excellent, but not quite such sure croppers; the foregoing are all worthy of a south or south-west wall.

I would say here that it seems to me incomprehensible that planters should persist in planting such plums as *Victoria* on a south wall, where they are quite out of place and the fruit they produce is so "mealy" as to be almost uneatable, and yet one sees hundreds of them in this position; on a north or east wall they do well. Space forbids my giving lists for each aspect, nor can I mention more varieties; I might easily extend the list, but have confined my remarks to the cream of those kinds grown in the Midlands. I must, however, say a word about a plum which has, at a somewhat recent date, been honoured by an award from this Society; I refer to *Early Favourite*. This variety has been before the public for nearly forty years, and has been discarded by nearly every cultivator on account of its extreme shyness; I think, therefore, a note of caution is not out of place.

I have reserved the Damsons for a word to themselves; from a profitable point of view I should certainly not have placed them last, for I know no fruit that, taking the average of seasons, pays the same amount of money as the Damson. By far the most popular variety in the Midlands is the Damascene, Cheshire, Shropshire, or Prune, and many a cottager pays his rent year by year from some half-dozen trees in his garden. The demand for the fruit is very great; in seasons of great plenty the dyers purchase them by the ton and—may we whisper it?—"Port wine" is said to be manufactured therefrom; but apart from this there is always a very large sale in our northern towns for cooking, preserving, and bottling. The fruit ripens at a time when nearly all other plums are over, and when fortunately our home-grown fruit meets with no competition from abroad.

Damsons are grown in America, but they seem to be confined to the English-speaking race, and I never heard of their being grown on the Continent.

Bradley's King of Damsons is an excellent variety, an early and heavy bearer, of good quality, ripening a little earlier than the Damascene, and will doubtless become a popular kind. The famous Crittenden or Farleigh Prolific, the dwellers in the Midlands will have none of, and although the nurseryman may propagate, the planters will not purchase.

I have spoken of the Damascene as the Prune: it is sometimes called by this name, but it is, of course, quite distinct from the true Herefordshire Prune, of the merits of which I cannot as yet say much. Mr. Smith of Mentmore kindly sent me some trees about twelve years ago, but although they have grown freely and made fine trees, they have up to now failed to produce fruit. At Mentmore I hear this variety crops well, and is much esteemed. Damsons are useful for planting on the outsides of plum-orchards, as they form a good shelter from the wind for the other trees.

It is generally conceded that all fruit-trees do better on cultivated land than upon land which is grass, but the plum is, perhaps, of all others essentially a fruit for cultivated orchards or gardens. Where cattle have access to the trees they frequently damage them to a serious extent. Plums should be gathered with the aid of a step-ladder, or two ladders fastened together at the top, for as the wood is brittle, a heavy ladder placed against the

trees will frequently break them, especially in a young plantation. The fruit, when required for market, should be gathered before it is fully ripe; great loss is frequently entailed by neglect of this precaution, not only to the grower himself but also to other consigners, as fruit placed upon the market in bad condition has always a tendency to lower the general prices. Where fruit can be carefully gathered and conveyed by one's own vehicle to market, so as to preserve the bloom, it will always command an extra price, and it is surprising that more pains are not taken by the average grower upon these little points. It is scarcely necessary to add that these remarks apply with still stronger force to fruit grown for private use. If the trees are looked over several times instead of gathering all the fruit at once, the season of each variety is considerably prolonged. In gathering plums for dessert, they should be pulled in the early morning whilst cool and handled with the utmost care; when placed upon the table they should be in dishes with only one layer of fruit resting upon a few leaves. Presented in this way, with all their bloom upon them, they are tempting to the most epicurean; but when one sees them rubbed, shiny, and piled up into a pyramid, one is apt to be reminded of the *polished* fruit one sees in the markets, and to pass them by untasted.

I fear this paper has been somewhat lengthy, and also discursive, but it may be asked why, having touched upon so many things, I have not said anything about new plums. With regard to the newer varieties distributed in this country, we have a fair number on trial, but I take it the consideration of their merits or shortcomings falls rather within the scope of a paper upon "New Fruits" than in the present article. With regard to the Japanese plums, I cannot say much from personal observation. I purchased several varieties, but they succumbed to the severity of our winters in less than two years; the majority died the first season, and the remainder dragged on an enfeebled existence, until the next winter promptly ended their sufferings. Our American friends speak very highly of "Burbank" (a Japanese variety imported by Mr. Luther Burbank), which they describe as "entirely hardy." The fruit, as coloured in "U.S.A. Department of Agriculture's Report upon Pomology," much resembles "Orleans," but is redder in colour. It remains to be seen whether it is hardy in this country. Mr. Burbank, whose

experimental grounds are at Santa Rosa, California, has raised a considerable number of hybrids between the American and Japanese races of plums, and also some cross-bred prunes, which he describes as of great merit. I cannot speak of any of them from personal observation.

In conclusion, may I say a word about the value of the plum for filling up gaps in old orchards. Most practical orchardists know how useless it is to replant apple-trees on the site where apples have been grown previously (though alas there are hundreds, perhaps thousands, of trees condemned to a lingering death each year for lack of this knowledge), whereas plums will grow very well in such places if the land be fairly fertile. I have omitted to say anything about the enemies of the plum; they are not many, and most of them easy of conquest. Perhaps from this very cause it arises that one so frequently sees the trees at this season of the year smothered up with aphids. The sluggard says they will do no harm, but the careful cultivator knows full well that they will weaken the shoots, prevent their ripening, and so destroy the chance of either fruit or good growth in the coming season.

These rough notes, written down at odd moments in a busy life, are offered, trusting they may be found to contain a few practical truths, and that attention may be drawn to a fruit which is at present somewhat neglected in our gardens.

NEPENTHES.

By Mr. HARRY JAMES VEITCH, F.L.S., F.R.G.S., &c.

[Read September 7, 1897.]

I PROPOSE to deal with *Nepenthes* almost solely from a horticultural standpoint. The part played in the economy of the plant by those curious appendages of the leaves, to which we give the name of pitchers; how they act as traps to decoy insects and other small animals; how the bodies of these creatures are decomposed by a fluid secreted from the walls of the pitcher; the chemical composition of this fluid, and the minute structure of the apparatus that secretes it; all these and other interesting

matters relating to *Nepenthes* have been so frequently and fully treated by others, that on the present occasion they may be altogether omitted, or only incidentally mentioned.

Probably no vegetable production more excited the wonder of early travellers in the eastern equatorial region than the *Nepenthes*, and the curious speculations indulged in respecting the purpose of the pitchers may pardonably provoke a smile from us who, with the aids and appliances of modern science, pride



FIG. 43.—*NEPENTHES* greatly reduced to show habit of growth (*Gardeners' Chronicle*).

ourselves on possessing a more accurate knowledge of their structure and functions. The oldest recorded intimation of the existence of these remarkable plants occurs in the "*Histoire de la grande Ile de Madagascar*," by Etienne de Flacourt, published in 1661, a book now numbered among the curiosities of literature and still preserved in national libraries, but to which I have not sought access. I therefore quote the following on the authority of Dr. Günther Beck, as given by him in his excellent monograph of the genus *Nepenthes*, recently published in the *Wiener Illustrirte-Garten Zeitung*:—Flacourt described and figured a *Nepenthes*, which had been discovered by Comerson, the first

European traveller in Madagascar, under the name of “*Amramatica*.” This *Nepenthes* was afterwards neglected or overlooked



FIG. 45.—*NEPENTHES LOWII*.

(From *Transactions of Linnean Society*.)

by botanists for 136 years, till it came to the knowledge of Poiret, who published it in 1797 in Lamarck's *Encyclopædia* as *Nepenthes madagascariensis*. It is worthy of remark that this, the first species to become known, was one of the latest to be introduced

into European gardens. This was brought about by Curtis, who sent it to our Chelsea nursery while on a collecting mission for us in Madagascar in 1878-79. It is really a handsome species, for although the pitchers are only of medium size, they are of very elegant shape and richly coloured. The other seventeenth-century authors quoted by Dr. Günther Beck are Bartholini (1673), who mentions a *miranda herba* he had either seen or heard of during his travels in the East; Grimm (1682), who describes a *planta mirabilis distillatoria*, that is *Nepenthes distillatoria*, a native of Ceylon, and Plukenet (1696), who mentions the same species under the name of *utricularia vegetabilis Zeylanensium*.

In the eighteenth century the *Nepenthes* were brought within the domain of science by Linnæus, at a very early period of his distinguished career. The only species known to him was *distillatoria*, of which he gives a minute and accurate description in his "Hortus Cliffortianus," and to him, of course, we owe the selection of the name *Nepenthes* for the designation of the genus. The selection is a remarkable one; the word is of Greek origin, and occurs in Homer's *Odyssey*, Book IV., line 221, where it means a freeing from or causing an oblivion of grief. The passage has been thus translated:—"She (Helen) threw a drug into the wine, from which they drank that which *freed men from grief*, and from anger, and causes an oblivion of all ills." Linnæus gives a perfectly satisfactory reason for the selection of this singular word for a plant name. Alluding to the pitcher, he writes:—"If this is not Helen's *Nepenthes*, it certainly will be for all botanists. What botanist would not be filled with admiration if, after a long journey, he should find this wonderful plant. In his astonishment past ills would be forgotten when beholding this admirable work of the Creator." Curiously enough, Mr. Burbidge, who at the time was on a mission for us in Borneo, seems to have realised Linnæus' sentiment on making the ascent of Kina Balu, in company with Mr. P. C. M. Veitch in 1877, when they first came upon the magnificent species which grow on that mountain, for he tells us,* "All thoughts of fatigue and discomfort vanished as we gazed on these living wonders of the Bornean Andes. To see these plants in all their health and vigour was a sensation I shall never forget."

* "Gardens of the Sun," p. 100.

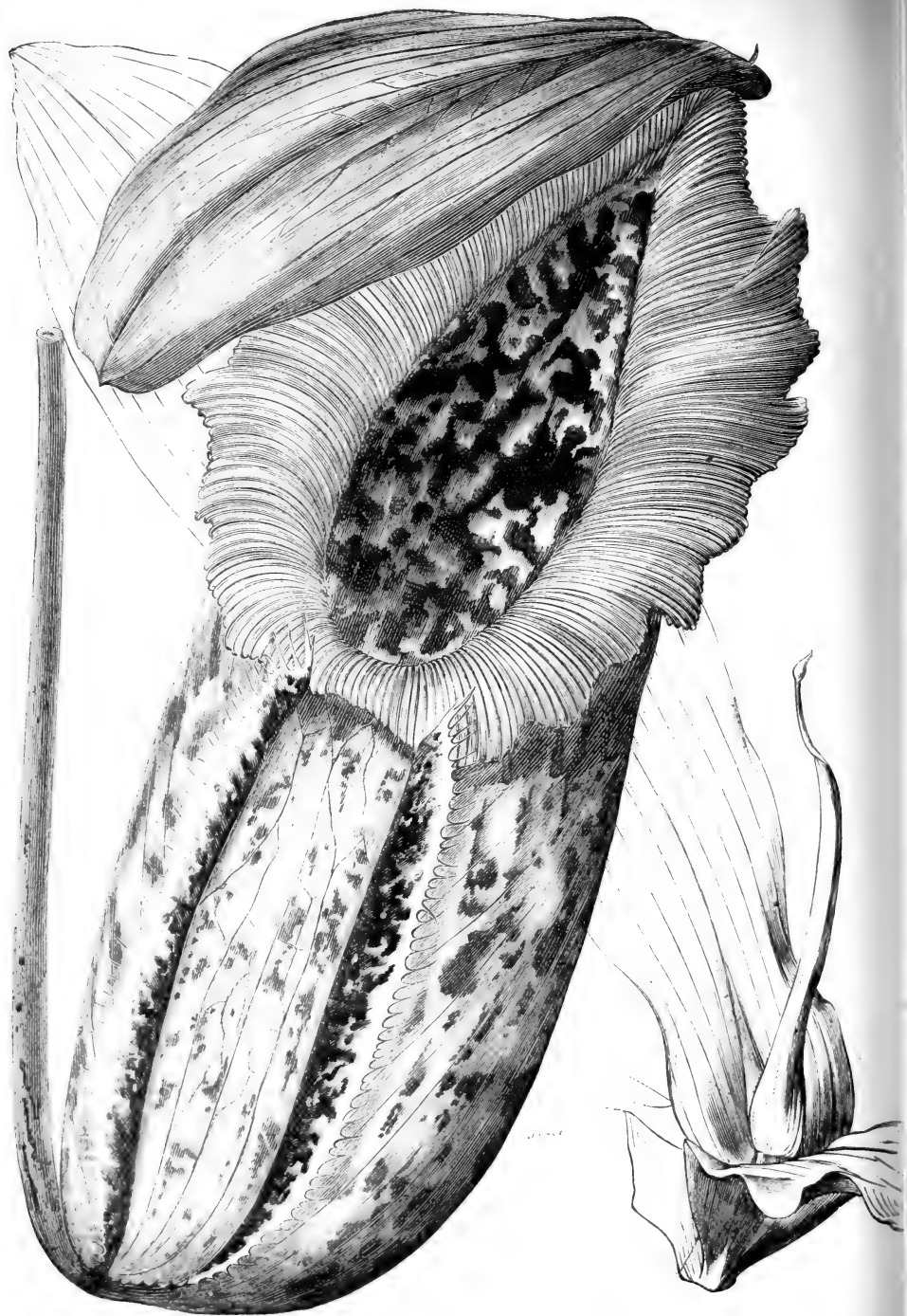


FIG. 46. —*NEPENTHES NORTHIANA* (Mast.).

Ten years after the publication of the "Hortus Cliffortianus," Rumph's "Herbarium amboinense" appeared, in which the author describes at great length a *Nepenthes* he had met with during his voyage from Japan to Malacca. It is not quite certain which species is intended, as the drawing accompanying the description is poorly executed; but it is probably the small pitched *gracilis*. We next come to Loureiro, the Portuguese naturalist, who visited Cochin China in 1790. In his "Flora cochinchinensis," published three years later under the editorship of Willdenow, at Berlin, one more species is brought to light, *Phyllamphora*. Loureiro's notion of the plant must have been founded on an imperfect observation, for he concludes his description with the statement that "attached to the side of the pitcher is a lid which of its own accord is opened or shut to receive and absorb the dew."

I have given a sketch of the history of *Nepenthes* up to the end of the eighteenth century. It is but a disjointed sketch, for the earlier literature of the genus, although not extensive, is much scattered. Coming nearer our own times, the task is somewhat easier, and the narrative more connected.

Among the earliest additions to the genus in the present century, were *Rafflesiana* and *ampullaria* discovered by Dr. William Jack at Singapore, when the British settlement there was founded by Sir Stamford Raffles in 1819. *Rafflesiana*, as we learn from the *Botanical Magazine* (sub t. 4, 285), was first introduced to the Royal Gardens at Kew by Captain Bethune in 1845. Two years later *Hookeriana* was sent from Borneo to the Clapton nursery by Mr. (now Sir Hugh) Low, and shortly afterwards our collector, Thomas Lobb, sent a whole group of species to our nursery at Exeter, which included *Rafflesiana*, *ampullaria*, *albo-marginata*, *Veitchii*, *Phyllamphora*, *sanguinea*—this latter discovered by him on Mount Ophir—and an unnamed species that afterwards participated in the parentage of the first hybrids raised. Although not the first *Nepenthes* cultivated in Great Britain, these species formed the nucleus of the large collection subsequently brought together at Chelsea.

According to Aiton,* *distillatoria* had been introduced to Kew from Ceylon in 1789, but was soon lost. Loddiges reintroduced it, and figured it in his *Botanical Cabinet* for 1826; the

* "Hortus Kewensis," ed. II., 420 (1813).

plant had then been in his houses six or seven years. In the same year Sims figured and described *gracilis* in the *Botanical Magazine** under the name of *Phyllamphora*, in the belief that it was the same species as that described by Loureiro. This was followed in 1828 by a figure and description by Professor Graham, of Edinburgh, of *Khasiana* as *distillatoria*,† so that three species had been introduced before the close of the third decade, but soon lost, a circumstance not to be wondered at seeing that the cultural requirements of these plants were then but imperfectly understood, and the stoves of that age, heated by brick flues and tan beds, were totally unsuited for them. In the meantime the Dutch botanists, Blume and Korthals, stationed at Buitenzorg, in Java, had brought to light several species previously unknown, the latter of whom published in 1842 a list or monograph of the species known to him. And two more had been discovered in the Philippines by Blanco, who gives a curious account of them in his “*Flora Philippinensis*,” which appeared in 1837.

By far the most remarkable discovery of new species was made in 1851 by Sir Hugh Low, who, in the face of the most discouraging difficulties, succeeded in making the ascent of Mount Kina Balu, in Borneo, where he was rewarded for his toil by finding four of the finest species known—namely, *Rajah*, *Edwardsiana*, *Lowii*, and *villosa*. He failed, however, to introduce any of these species, but he brought home excellent dried materials which enabled Sir Joseph Hooker to give a lucid account of them in a paper read before the Linnean Society in June 1859, and subsequently published in the Transactions of the Society. With a view, if possible, of securing these remarkable plants, Thomas Lobb, acting under instructions from the late Mr. James Veitch, reached the foot of Kina Balu in 1856, but was prevented from ascending the mountain by the hostility and extortion of the natives. In 1858 Sir Hugh Low again made the ascent in company with Mr. Spenser St. John, but again failed to get plants home alive. Mr. St. John gives some interesting particulars of these *Nepenthes*, dried pitchers of all of which are before you, as seen in their native home, and also a fresh pitcher of *Rajah* kindly sent to me by Mr. F. W. Moore, of Glasnevin, to whom I gladly avail myself of this opportunity of

* Tab. 2,692.

† Tab. 2,798.

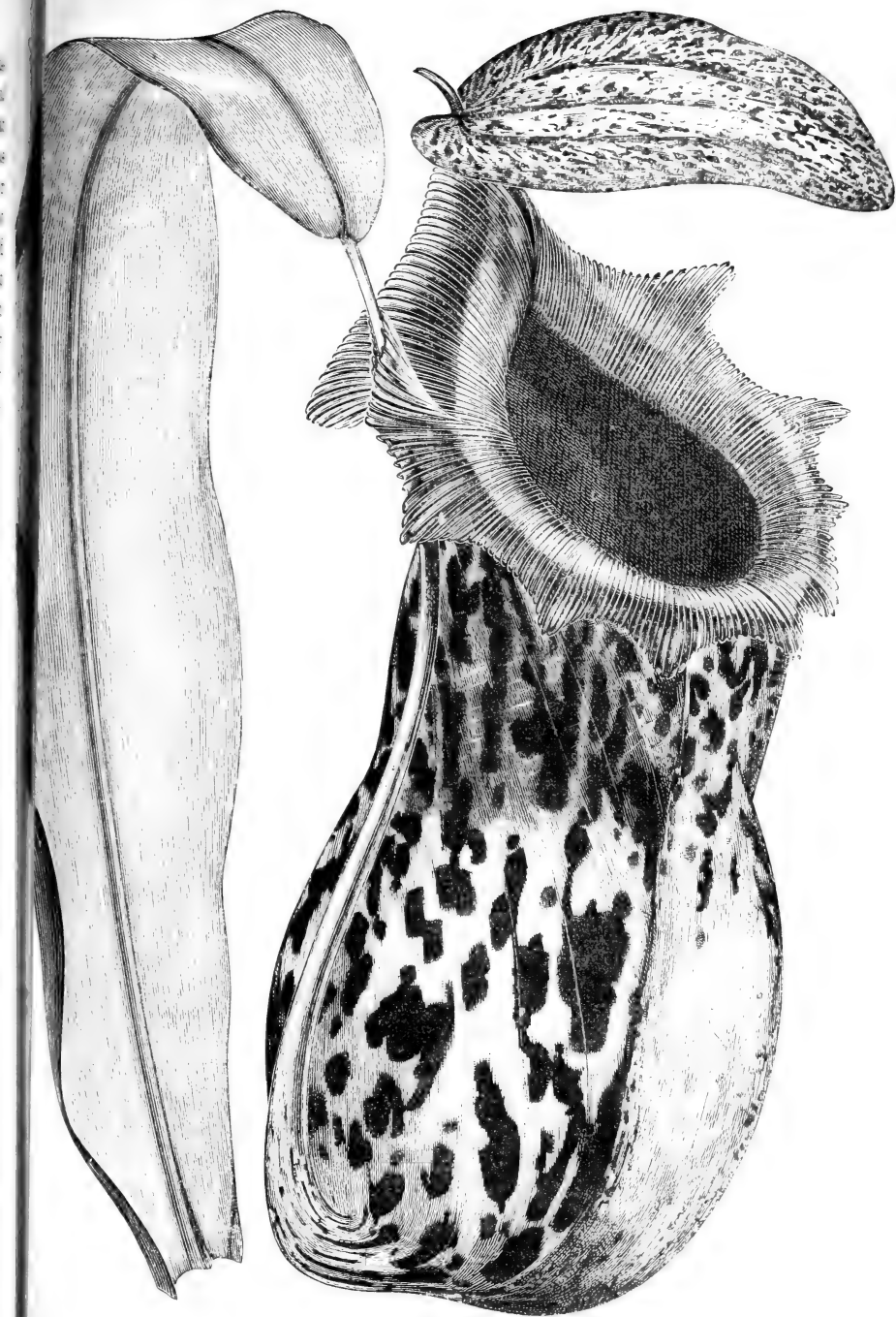


FIG. 47.—*NEPENTHES BURKEI EXCELLENS* (Mast.).

tendering my best thanks. This pitcher is by far the finest of the species that has yet been produced under cultivation. I will quote in part Mr. St. John's descriptions:—"All the species are more or less abundant. *Rajah* (Fig. 44, see p. 228) is a dwarf plant rarely more than four feet high: its large pitchers rest on the ground in a circle. One splendid specimen was found to hold four pints, and in another was found a drowned rat; the pitchers become a deep violet purple with age. *Edwardsiana* is a twining plant; the stem of one on being measured was found to be 20 feet long, and one of its bright brick-red pitchers measured 21½ inches in length. *Lowii* (Fig. 45) is easily distinguished from all the rest by its strikingly curious shape, and by the absence of a dilated ring round the aperture: it is bright pea-green outside and mahogany red inside. *Villosa* occurs higher up the mountain than any of the others: it has a downy peach skin with a good deal of crimson on it, and a strongly lamellated flesh-coloured ring.*

Another attempt to get these *Nepenthes* was carefully planned and pluckily made in December, 1877, by Mr. F. W. Burbidge and Mr. P. C. M. Veitch, and repeated eight months later by the first-named naturalist, but with scarcely any better success than attended Sir Hugh Low and Mr. St. John. Seeds of *Rajah* were indeed sent home to my firm and some of them germinated, but very few indeed of the seedlings have lived. It seems that as the conditions of climate and environment under which these species live are difficult to imitate, even approximately, the means for their successful culture have yet to be arrived at.

A great impulse was given to the cultivation of *Nepenthes* and other insectivorous plants by the Presidential address of Sir Joseph Hooker before the Biological Section of the British Association for the Advancement of Science at Belfast in 1874. Not long previously the same eminent botanist had compiled the monograph of *Nepenthes* for De Candolle's "*Prodromus*," still the standard for reference, and which proved to be of especial value at that time as a guide to searching for the unintroduced species known to science. In 1872 there were ten species of *Nepenthes* in cultivation, and four hybrids all raised in our nursery which are enumerated and described by Dr. Masters in

* "*Life in the Forests of the Far East*," Vol. II.

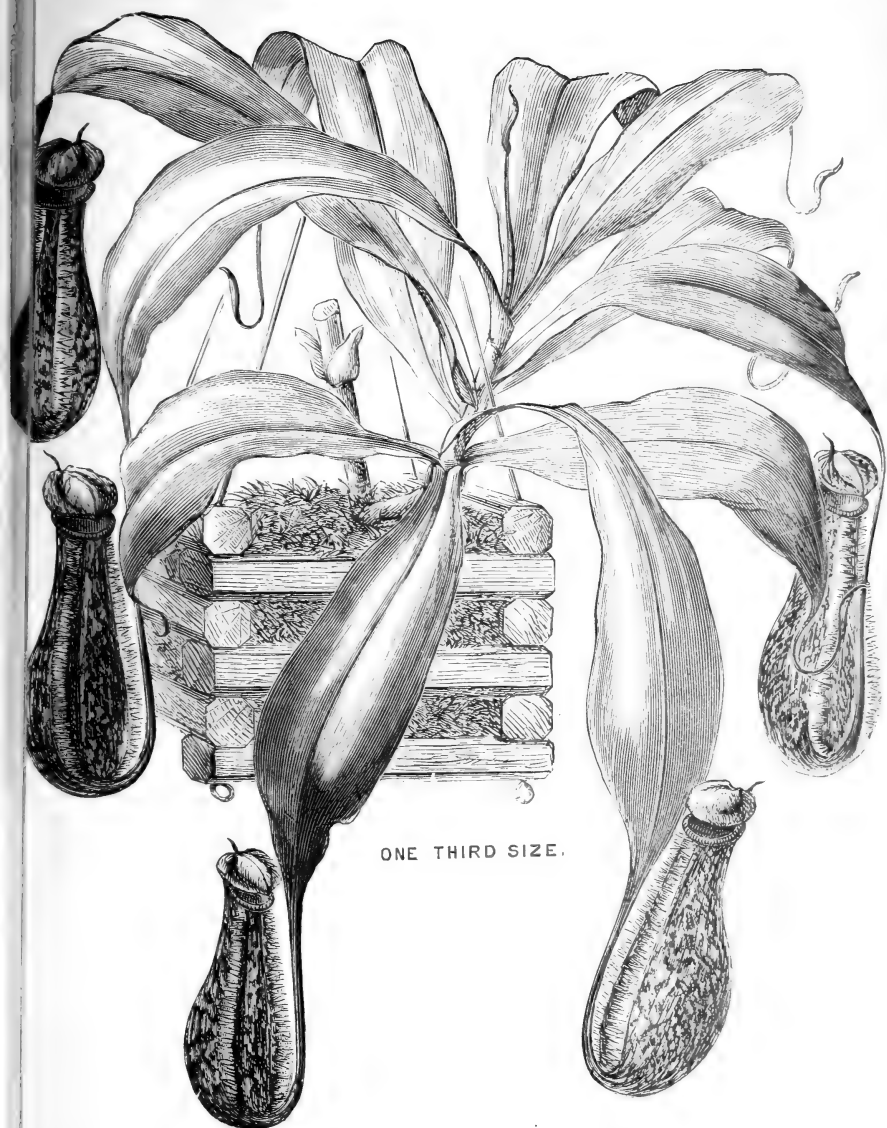


FIG. 48.—*NEPENTHES* × *SEDENII* (Khasiana × unnamed species).

the *Gardeners' Chronicle* for that year.* During the ten years that followed, seven more species were introduced by my firm, and more hybrids were raised at Chelsea, of which further mention will be made presently. The species included some of the finest in the genus; they were—*Rajah* and *bicalcarata* from Borneo, through Burbidge; *hirsuta*, from the same region through another agency; *madagascariensis*, through Curtis; *Kenedyana*, from North Australia; and *Vieillardii*, a native of New Caledonia, through the Botanic Garden at Sydney; and *Northiana*, through Curtis, from North Borneo, the last-named under circumstances of exceptional interest which I will relate. In the summer of 1880, I was invited by the late Miss Marianne North to inspect the collection of drawings she had made during her travels in the Far East; amongst them I came across one of a *Nepenthes* which I at once saw was a new species. On making inquiry respecting its habitat, she could only inform me that while staying in north-east Borneo, a native brought her a pitcher with which she was so much struck that she at once made a drawing of it. It happened at that time that we were about to send a collector to Malaysia, and Curtis undertook the mission. Miss North very kindly allowed him to see the drawing, and she also gave him such information as she possessed respecting its habitat. Curtis received special orders from us to try and introduce the plant into Europe. He told me on his return that he had experienced much difficulty in finding the plant, that he had searched for it many days in vain, and had even decided on giving up the search, in the belief that Miss North had been wrongly informed respecting the locality in which it grows. Before leaving the place it occurred to him to look over a steep escarpment in the hill-side, which he accomplished by lying prostrate on the ground, and to his great joy he discovered the plant growing at some distance beneath him. He succeeded in reaching it, and happily found some seed capsules, which he lost no time in transmitting to Chelsea, where the seed soon germinated. Dr. Masters at our request dedicated this fine species to the excellent lady who helped us to introduce it; it has proved to be one of the most tractable under cultivation as it is one of the handsomest of the genus (Fig. 46).

During a second mission to Malaysia in 1882-83, Curtis sent

* Pp. 540-542.

home two more species previously unknown, one of which is named after him, and the other, at first supposed to be a variety of *Curtisii*, has since received specific rank from Dr. Masters under the name of *stenophylla*.* In the following year the late David Burke collected plants and seeds of two species in the Philippine Islands, one of which, a very variable but decidedly beautiful one, we are distributing under his name (Fig. 47). Whether these species are the same as those detected by Blanco fifty years earlier is a question yet to be decided. Burke subsequently collected a further supply of seed of *Northiana*, and amongst the seedlings appeared a supposed hybrid between that species and *albo-marginata*, and which has received the name of *cincta*.* And, lastly, in 1890 we received from a correspondent in the Seychelles seeds of *Pervillei* many of which germinated: this species has since been introduced to Kew through Mr. Griffith, the Administrator of the islands. I am glad to be able to show a living plant of this species, kindly lent by the Director of the Royal Gardens at Kew. The number of introduced species including *cincta* and two unnamed ones is thus brought up to twenty-four. Some of them have since disappeared, to be followed doubtless by others from causes that will best be understood when dealing with the hybrids. To these we will now direct our attention.

The first hybrid *Nepenthes* was raised by Dominy, and bears his name. It was exhibited by us at the Royal Horticultural Society's Show at South Kensington in June 1862. Dominy also raised a second hybrid named *hybrida*. He was followed by Seden, who raised the hybrid that bears his name (Fig. 48), and a second called *Chelsonii* (Fig. 49) from *Hookeriana* and *Dominii*. The work of hybridisation has been continued whenever staminate and pistillate flowers have been simultaneously available, whether of species or hybrids. Some of the results obtained may be ranked in a horticultural sense amongst the finest additions to the genus, notably *Mastersiana* (Fig. 50) and *Dicksoniana*. The first-named was obtained in our nursery by Court from *Khasiana* and *sanguinea*; the second is the offspring of *Rafflesiana*, flowering in the Botanic Garden at Edinburgh, fertilised with the pollen of *Veitchii*, supplied from our Chelsea nursery. The cross was effected by Mr. Lindsay and the progeny is dedicated to the late Professor Dickson.

* Gard. Chron., s. 3 VIII. (1890), 240. Id. XXI. (1884), p. 540.

Variability chiefly in the colour and slightly in the form of the pitchers was observable amongst the progeny derived from a single cross in the earliest experiments made, a variability that has been still more pronounced in the results of later crosses, especially when one or both parents are themselves hybrids. Owing to this cause and the imperfect record of some of the earlier crosses, some of the statements made from time to time respecting parentage cannot be vouched for. Although upwards of forty hybrids are enumerated, it is certain they do not represent so many distinct crosses; in fact, a considerable number of them are varietal forms that appeared amongst the progenies obtained from crosses between the same pair of parents.

The following may be accepted as genuine hybrid types, that is to say, the pitchers of these hybrids, the most reliable organ for discrimination, bear evidence in shape, colour, size, &c., of their having been derived from the parentage assigned to them:—

1. *Dominii* from *Rafflesiana* and an unnamed species from Borneo (Fig. 51).

To this type must be referred *intermedia* and one or two more that have since disappeared from cultivation.

2. *Hybrida* from *Khasiana*, then in cultivation as *distillatoria*, and an unnamed species from Borneo.

To this must be referred *hybrida maculata*, *Courtii*, and *rubro-maculata* as varieties.

3. *Sedenii* from *Khasiana* and an unnamed species (Fig. 48).

4. *Mastersiana* from *Khasiana* and *sanguinea* (Fig. 50).

5. *Cylindrica* from *hirsuta* and *Veitchii*.

6. *Rufescens* from *hirsuta* and *hybrida* × var. *Courtii*; a secondary hybrid.

7. *Dicksoniana* from *Rafflesiana* and *Veitchii* (Fig. 52).

8. *Wittei* from an unnamed species and *Curtisii*.

9. *Mixta* from *Curtisii* and *Northiana*.

10. *Tiveyi* from *Veitchii* and *Curtisii superba* (Fig. 53).

The progenies obtained from these ten crosses were raised at our Chelsea nursery.

11. *Morganie* from *Sedenii* or *Phyllamphora* and *Hookeriana*, a hybrid of American origin raised by Taplin (Fig. 54).

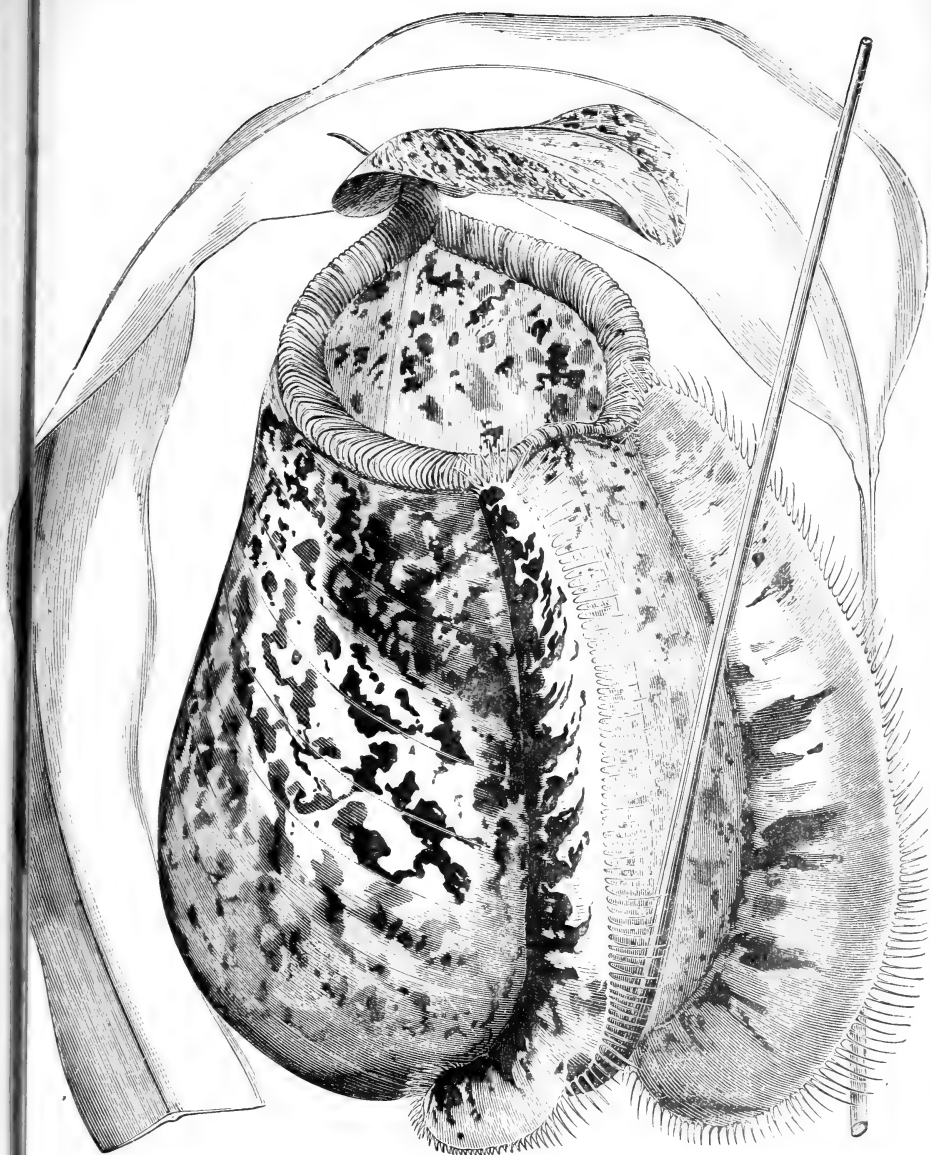


FIG. 49.—*NEPENTHES* × *CHELSONII* (*Hookeriana* × *Dominii*).

To this cross belongs *Stewartii*, *Ratcliffiana*, and *Wrigleyana* distributed by ourselves ; also *robusta*, *Outramiana*, *Williamsii*, *coccinea*, *Donnaniana*, *atrosanguinea*, and others distributed by Williams.

Besides these ten hybrids, we have at Chelsea the progenies of other crosses that have not been named and are not yet ready for distribution ; they include one primary hybrid, of which both parents are species ; two secondaries, of which one parent is a species and the other a hybrid ; and two tertiaries, of which both parents are hybrids, an intermixture of forms rapidly approaching that reached in the hybridisation of Orchids.

It may here be remarked of the majority if not of all of these hybrids that having been raised under the artificial conditions of a glass structure in this country, they have adapted themselves to those conditions with far greater facility than many of the species brought from the equatorial region. Of course there are well-known exceptions in those species that have long been denizens of our houses, as *Rafflesiana*, *Hookeriana*, *ampullaria*, *Khasiana*, *Phyllamphora*, &c. Although no hybrids derived from present resources can ever supply the place of such species as *Rajah*, *Edwardsiana* (Fig. 55), *villosa* (Fig. 56), and *Lowii*, the results of present and future hybridisation are doubtless destined to be the predominant factors of the *Nepenthes* in a horticultural sense. Regret may be felt for the disappearance from gardens of species that have been introduced, but the horticulturist whose object is to render available for general use plants of the greatest interest or beauty that can be grown with the greatest facility must necessarily devote his time and labour to the cultivation of such.

It is now time to turn to the plants themselves and to note such features in their life-history as should come within the cognisance of all cultivators of them.

The embryo of the seed is not distinguishable even with the aid of an ordinary pocket lens, but under the microscope it is seen to be differentiated into an exceedingly minute axis and two relatively large cotyledonary leaves. The seeds are usually sown on the surface of a compost of peat fibre and chopped sphagnum, in pots drained to three-fourths of their depth, and placed in a closed frame in a glass house in a temperature of 21°-24° C. (70°-75° F.). Under these conditions the cotyledons

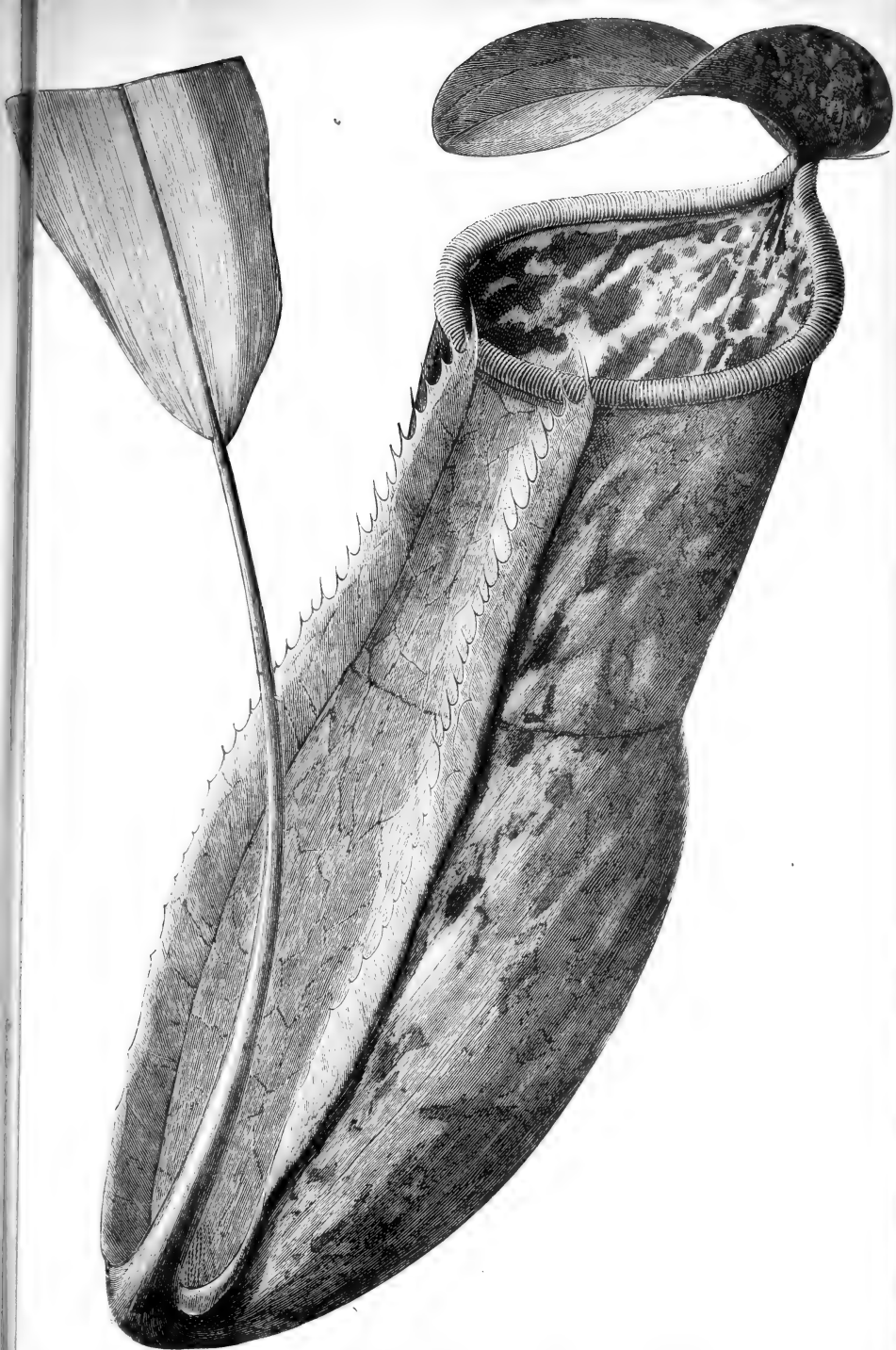


FIG. 50.—*NEPENTHES* × *MASTERSIANA* (*Khasiana* × *sanguinea*).

of fresh seeds appear in six to eight weeks, according to the season of the year. The infant plant with the two seed leaves and tiny rootlets is shown in Fig. 57, 1. Three to four or more weeks elapse before any further change is detected, when the first pair of true leaves, with a minute sessile pitcher at the apex of each, are developed as shown in Fig. 57, 2. A second similar pair succeeds them, and after the lapse of three or four months the plant has attained a form pretty much as represented in Fig. 57, 3. Fig. 57, 4, represents a plant about twelve months old: it shows approximately the progress that has been made in the interval in the case of plants from seeds ripened under the same artificial conditions. In the case of imported seeds the rate of growth is much slower.

The stems of vigorous growing *Nepenthes* will lengthen 3 to 4 feet in a single season and will have depending from them twelve to eighteen pitchers. In practice, it is not usual to allow the stems to ascend far unless the plant is especially intended for flowering. After a few weeks' growth, the stems are, in the language of gardeners, "stopped," that is to say, the point is pinched or cut off, which results in a branching at or near the base; by this means pitchers of the most desired shape and colour are obtained. In the wild state the stems of *Nepenthes* continue to lengthen year after year till, for want of support, they fall by their own weight, resulting often in fracture and a consequent change in the direction of axial growth. Instances are recorded of the stems of *Nepenthes* attaining a length of 30 or more feet, being supported by the trees against which they grow; and where the prolonged midrib of the leaf is brought into contact with a slender twig it will coil round it, and in this way the plant obtains its support. It would seem, from observations somewhat vaguely recorded, that as the stems increase in length at their apical end so do they die off at the opposite or basal end. *Nepenthes* are but poorly provided with roots, probably on account of the temporary duration of their stems, which have the power of sending out new roots into the thick covering of moss and lichen frequently found on the trunks of trees growing in a highly humid tropical climate. The *Nepenthes* are thence not wholly land plants, but epiphytal under certain circumstances.

Foliation.—There is great similarity in the foliage of all

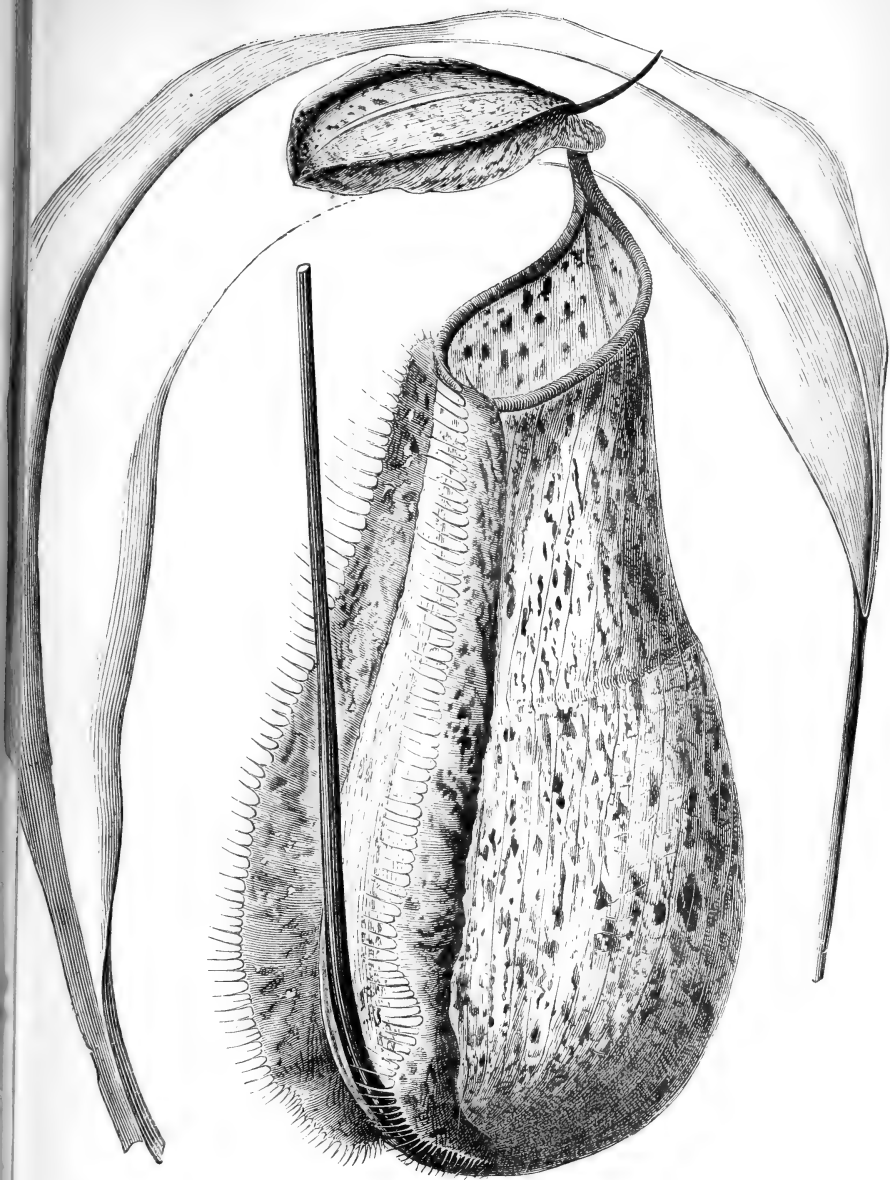


FIG. 51.—*NEPENTHES* × *DOMINII*, var. *INTERMEDIA* (Khasiana × unnamed species).

Nepenthes. Differences in the size and shape of the lamina or blade, here conventionally called the leaf, are of frequent occurrence, and many of the species have their own characteristic form. Generally the species with the smaller pitchers have the smaller leaves, but the correlation of leaves and pitchers, as regards size, is not always proportionate. The leaves are of leathery texture, either quite smooth or studded with minute hairs as in *Veitchii*; they are for the most part narrowed at the base into a winged petiole or foot-stalk, which in some species partially embraces the stem from which it is produced. But by far the most striking phenomenon connected with the leaves is the prolongation of the midrib and the development at its extremity of the wonderful organ which always excites the admiration and curiosity of the beholder—I mean the ascidium or pitcher to which I will now direct attention.

Pitchers.—The pitchers assume a remarkable variety of form, size, and colour, a variety that would be greatly enhanced by the addition of the unintroducted species as shown by the dried pitchers of *Lowii*, *Edwardsiana*, and *villosa*. *Phyllamphora*, *gracilis*, *ampullaria*, and the hybrid *Sedenii* have pitchers less or not much larger than a man's thumb; on the other hand, *Northiana*, *Rafflesiana*, *bicalcarata*, *Veitchii*, and *sanguinea* are remarkable for their large size and diversity of shape and colour. Between these two groups may be intercalated a large series of forms of both species and hybrids showing scarcely less variability in form and colour.

The origin of the pitchers of *Nepenthes* and their development was investigated many years ago by Sir Joseph Hooker, and described by him in a classic paper published in the "Transactions of the Linnean Society," to which reference has been already made. The principal facts observed during the examination led him to the conclusion that "the pitchers are modifications of a gland situated at the apex of the midrib of the leaf," and various structural details of different stages of growth are adduced in support of this view. To enter into these details would be beyond the scope of this paper, but it is none the less interesting to trace the development of these curious appendages from the infant to the adult state of the plant.

In the seedling plant the pitchers make their first appearance in no very definable state at the apex of the first leaves formed



FIG. 52.—*NEPENTHES* × *DICKSONIANA* (*Rafflesiana* × *Veitchii*), $\frac{1}{2}$ nat. size.

after the cotyledons, the cotyledons themselves showing no trace of even a rudimentary pitcher (Fig. 57, 2 and 3; p.253). In the stages of growth immediately following, the pitchers assume a more definite form, the operculum or lid and the ciliated ventral wings are more clearly differentiated from the body of the pitcher. These young pitchers are at first continuous with the blade and form part of it, then sessile, and later separated from it by a prolongation of the midrib; they are produced simultaneously with the blade, not *after* it as in the adult plant. These infantine pitchers are always found to contain a viscid fluid secreted by numerous glands seated in the epiderm of the inner surface which may be easily detected by the aid of a pocket lens; these glands are fairly distributed over the whole inner surface of the pitchers of young plants but in older plants on which the pitchers have attained more or less their normal size, the glands are confined to a certain area which varies considerably in extent in the different species; the secretions also are more copious, become less viscid and have a peculiar flat and insipid flavour, implying the presence of ingredients not found in the composition of water. This watery fluid is preserved intact by the lid which remains firmly closed till the pitcher has nearly attained its full size.

As leaves continue to be produced, so a gradual change in the size and shape of the pitchers becomes apparent. Instead of the pitcher being produced simultaneously with the blade, it lags behind as it were, the midrib is perceptibly prolonged beyond the apex of the blade while the pitcher is still rudimentary, and this continues till leaves are produced with full-sized pitchers. If the stem is allowed to grow without check, the pitchers appended to the leaves successively produced undergo a change in shape and dimensions still more remarkable than what takes place during the progress of development from the infantine to what is regarded as the perfect form of the pitcher. To understand clearly the extent of the change, it is necessary to note the various parts of the pitcher; for this purpose *Rafflesiana* affords an excellent type. The pitcher of this species in its best form is of flask-like shape, it is most dilated at the bottom and gradually contracts upwards; it is furnished on the front or ventral side with two broad coarsely ciliated or fringed wings; on the opposite or dorsal side there is a keel marking the continuation of the

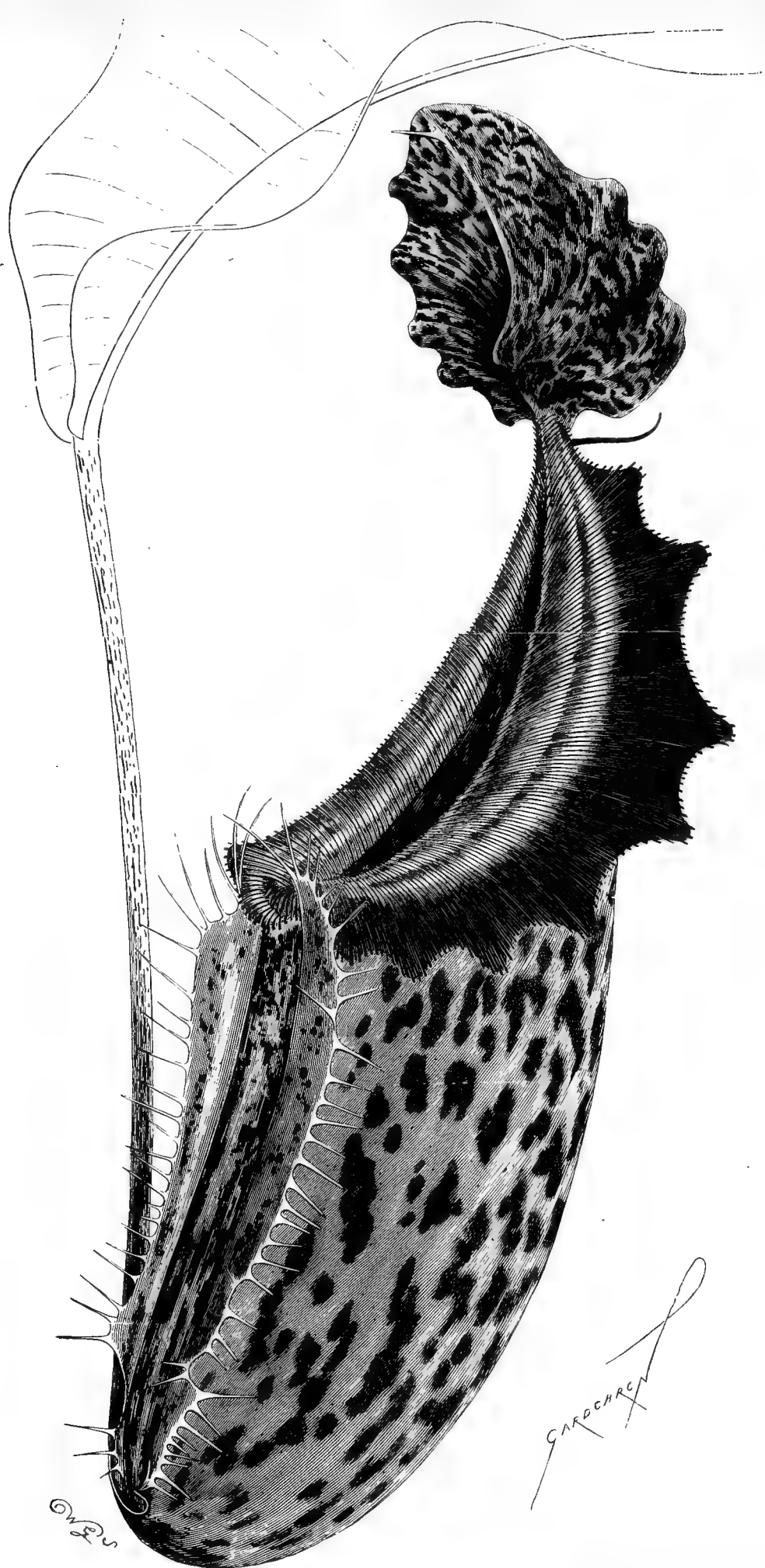
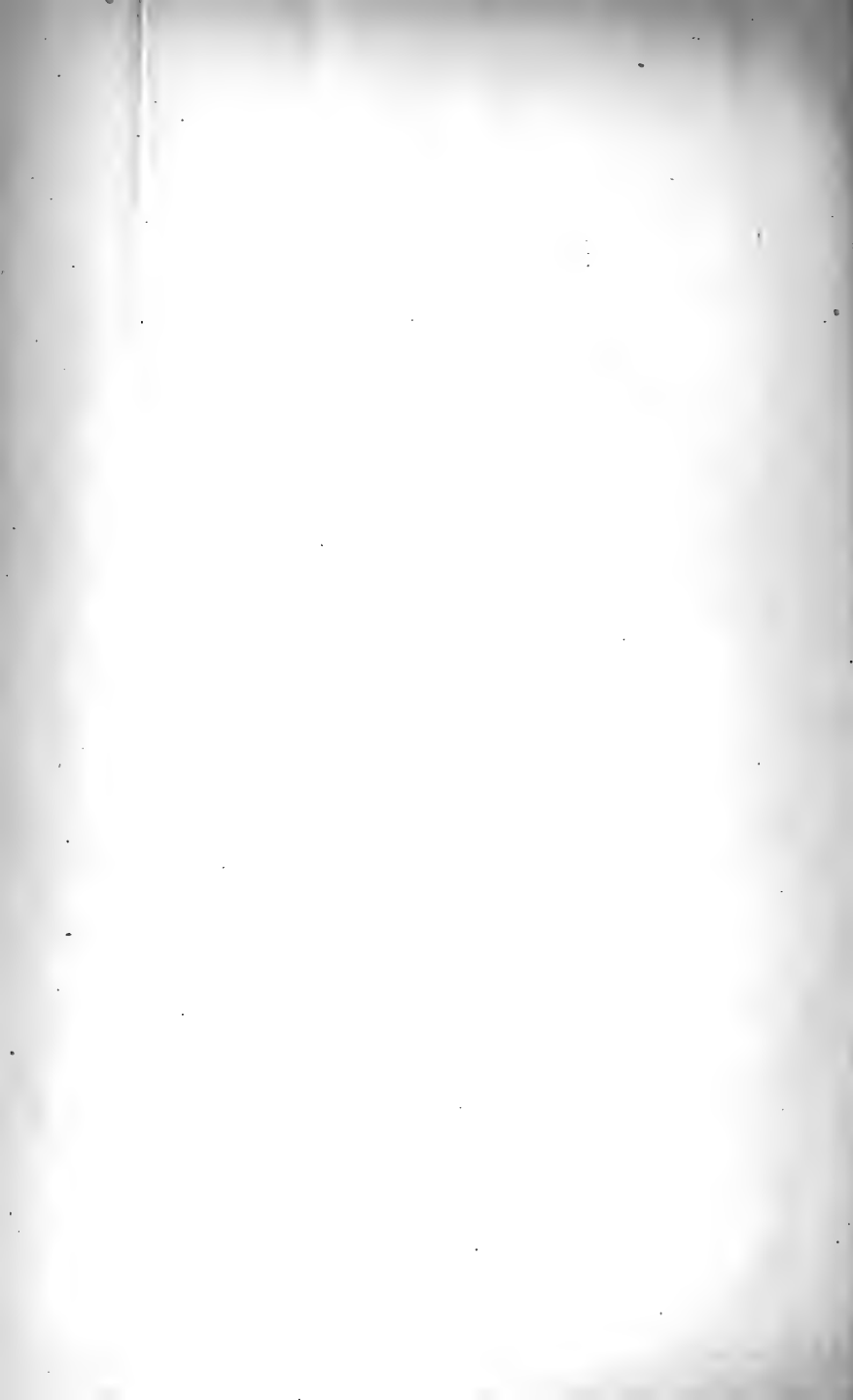


FIG. 53.—*NEPENTHES* × *TIVEYI* (*Gardeners' Chronicle*).



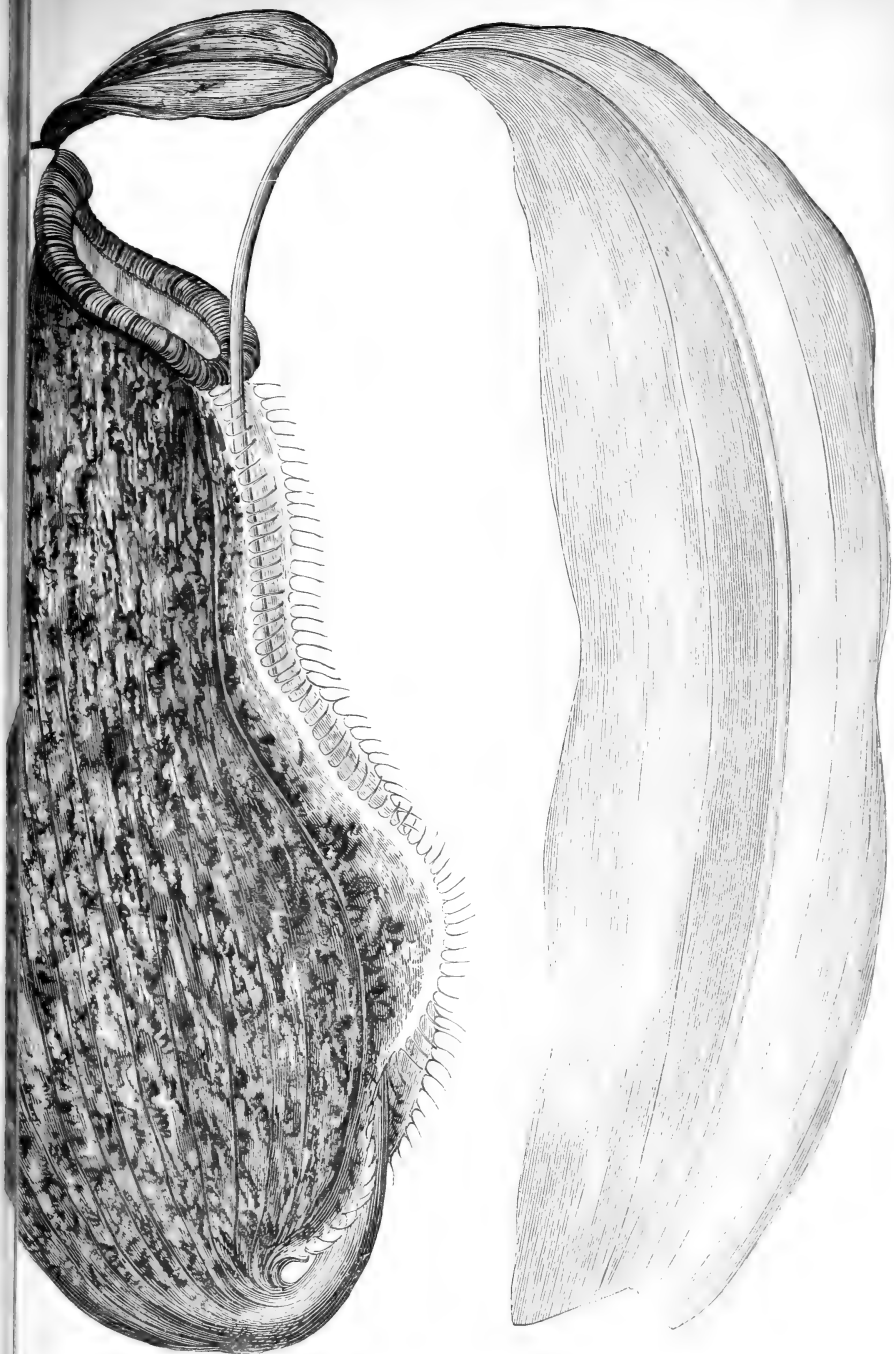
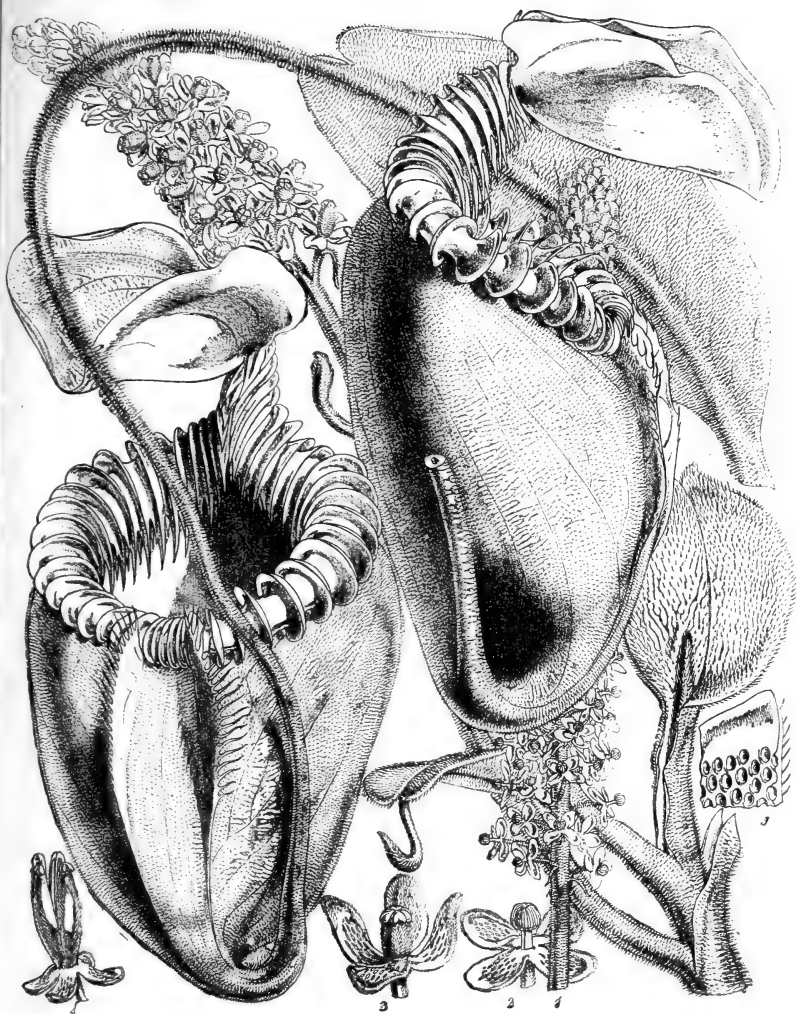


FIG. 54.—*NEPENTHES* \times *MORGANIE* (*Sedenii* or *Phyllamphora* \times *Hookeriana*).

prolonged midrib to the point of articulation with the lid. This operculum or lid is a remarkable organ which, after being opened, stands high above the aperture in a horizontal or ascending direction, being raised by the triangular process on which it is articulated. Around the aperture is the peristomium, a ring which varies much in the different species in breadth, colour, and shape; the inner edge of this ring is armed with sharp teeth which effectively prevent the escape of the entrapped insects. The peristomium is a striking ornament of the pitcher in the curiously shaped pitcher of *Lowii* the peristomium is absent, the only known case. In all the species there is a sharp spine on the dorsal side at the articulation of the lid and pitcher; in *bicalcarata*, in addition to this there are two strong sharp spurs on the opposite or inner side, whence the specific name. The pitcher in its perfect form, as I have attempted to describe it, takes an erect position with the ventral side opposite and often pressed against the prolonged midrib of the blade. The change in shape and size now about to be pointed out takes place much in the same manner in every species and hybrid, so that when this change has reached an advanced stage it is difficult to identify from the pitcher itself to what species it belongs. These changes in size and form are also accompanied by a change in colour.

As leaf after leaf is produced from the ascending stem, the pitchers first become longer and narrower; then follows a gradual diminution of the parts while the pitchers are being modified from the flask-like to the cylindric shape; the ventral wings constantly diminish in breadth and the ciliate fringe disappears until the place of the wings is denoted only by two narrow keels, and instances have been observed in which even these are obliterated. The pitchers not only undergo change in size, form, and colour, but they also change their position in respect to the prolonged midrib. By the time the seventh or eighth pitcher has been produced above that which we have already referred to as the perfect pitcher, the prolonged midrib has made half a revolution on its own axis, so that the pitcher has now its dorsal side towards it. As the pitchers diminish in size with the ascent of the stem, so when a certain stage of growth is reached, and as the plants arrive at the time of flowering, they cease to be produced altogether, but the stem continues to grow

FIG. 56.—*NEPENTHES VILLOSA*. (Hook. f.)

and produce leaves with prolonged midribs affording a support to the plant and its inflorescence while maturing its seed. Sir Hugh Low observed of *ampullaria* which he saw in Sarawak, that the first formed leaves have no blades but only pitchers with which the ground is frequently covered as with a carpet. As the plant con-

tinues to grow the lamina of the leaves begins to be developed and it increases in size in successive leaves until the blade is perfect; as the blade increases the pitcher decreases in size with every new leaf and finally disappears altogether when the stem has climbed into the trees.*

INFLORESCENCE.—Flower spikes are produced when the stem has attained a considerable length, rarely otherwise. The inflorescence is pseudo-terminal, that is to say, the flower stalk is produced apparently from the end of the stem, but not really so, for the stem continues to grow simultaneously with the flower stalk but at a much slower rate, so that by the time the flowers are expanded the base of the peduncle is seen to be inserted opposite a leaf. The flower stalk sometimes attains a length of two feet and bears upwards of a hundred flowers; it is always racemed so far as our experience goes, but in the wild state it is said to be often branched (panicled). The flowers are dioecious, the pollen-bearing and the seed-bearing flowers being produced on different plants; the pedicels along the lower two-thirds of the raceme bifurcate or divide into two branches each bearing a single flower; those along the apical third are mostly simple, fig. 58, 11. The flowers are constructed on the tetramerous type, which means that all the parts or organs of the flower are in fours or in some simple multiple of four. Although this type of structure is the only one yet seen in cultivated plants, it is not absolute throughout the genus, an exception occurring in *Pervellei* which has not yet flowered in our houses but which is said to have but three perianth segments and ovaries with three chambers in the place of four.

The staminate or male inflorescence here shown is that of *Curtisii* (fig. 58, 5). Each flower has a perianth of four green segments, shown somewhat sharply deflexed in fig. 58, 6, which was drawn when the flowers were in an advanced state, but which are spreading like those of the pistillate flowers when first expanded; the flower is rightly shown in fig. 58, 7, as seen from above. The essential part of the flower is, of course, the andræcium, which consists of eight stamens whose filaments are united into a column, whilst the anthers form a compact head on the summit (fig. 58, 6 and 7). The seminiferous or female inflorescence (fig. 58, 8) is that of *mixta*, a hybrid between *Curtisii* ♂ and *Northiana* ♀.

* "Sarawak and its Productions," p. 55.

As in the pistillate flowers the perianth segments are four in number but coloured reddish brown instead of green (fig. 58, 9 and 10); above them is the four-celled superior ovary, on the upper end of which is seated the four-lobed stigma, the style of the pistil being altogether absent (fresh racemes of flowers kindly lent by Dr. Bailey Balfour, Mr. F. W. Moore, and Mr. George Wythes, &c., here pointed out). The structure of the flowers of *Nepenthes* is therefore extremely simple, and the manner in which fertilisation is effected may be seen at a glance.

FERTILISATION.—In the wild state fertilisation is effected by aerial agency; the structure of the flowers favours this mode in every way; the staminate flowers are produced in much larger numbers than the pistillate ones; the quantity of pollen even in a single raceme is great, and in the aggregate where many racemes or panicles of flowers are ready to discharge their pollen it must, relatively speaking, be enormous, leaving a large margin for the inevitable waste which occurs when wafted through the air. On the other hand, the pistillate flowers have their stigmas fully exposed; no obstacle is therefore interposed to prevent the minute pollen dust being caught by the viscid surface as it is carried along by the wind.

With us pollination is effected by simply dusting the stigma with pollen removed from the anther by a camel-hair pencil. In the warm and moist temperature of the stove the pollen grains begin to emit tubes in a very short time, and as they have no style to traverse they soon reach the numerous ovules. Fig. 58, 12 shows a transverse section of an ovary, and fig. 58, 13, two unfertilised ovules greatly enlarged. The precise time taken by the pollen tubes to reach the ovules has not been ascertained, but that it is not long is evident by the external change observable in the ovaries within a fortnight after pollination. The capsules and seeds figured are those of *Northiana* (fig. 58, 14 and 15), the flowers which produced them were fertilised in the first week of October of last year, and the capsules were matured early in the following January, or in about three months after pollination and during the winter season. As we know that in the summer months the capsules arrive at maturity in a somewhat shorter period, it is safe to assume that such is the case also in the wild state.

The number of seeds in each capsule ripened under cultiva-

tion may be set down as ranging from forty to sixty, but they are probably more numerous in the wild state. They are minute and light; those represented in fig. 16 were scarcely one-fifth of an inch long, somewhat spindle-shaped but greatly attenuated at each end. Their extreme lightness is highly favourable to their dispersion by the wind. So light are *Nepenthes* seeds that, according to Dr. Günther Beck, it takes 28,000 seeds of *Phyllamphora* to weigh a gramme, or, the almost incredible number, 870,000, to balance the English ounce.

GEOGRAPHICAL DISTRIBUTION AND CLIMATOLOGY.

The geographical distribution of *Nepenthes* presents nothing peculiar in itself; the region over which the species are spread is, as a whole, fairly well defined, and its climatology is now well understood. Of the thirty-six species, or thereabouts, known to science fourteen are confined to Borneo, three more are common to that and adjacent islands, thirteen more are extra-Bornean but strictly Malaysian, the remaining six are much scattered—there is one in North Australia, one in New Caledonia, one in Ceylon, one in the Seychelles, one in Madagascar, and one in North-East India. This enumeration shows that with the exception of the last-named (*Khasiana*) all the species are insular, and consequently all are found in relatively close proximity to the ocean. Besides this, with three or four exceptions, they all occur within the equatorial zone: this zone extends to about 12 deg. on either side of the equator. Most of the species are quite local, but there are some, as *Rafflesiana* and *Phyllamphora*, that have been detected in several places and on different islands at a considerable distance apart, whilst *gracilis* may be said to be almost ubiquitous throughout Malaysia. *Vieillardii*, in New Caledonia, is the most eastern species known, and *Pervillei* and *Madagascariensis* are the most western; the two last-named and *Khasiana* may be regarded as stragglers from the main body aggregated in Borneo and adjacent islands. Whilst by far the greater number of species occur near the sea-coast at a low elevation, the species with large pitchers, discovered by Sir Hugh Low on Kina Balu, occur only at elevations ranging from 5,000 to 8,000 ft. where the thermometer falls during the night to 5°–6° C. (41°–43° F.)

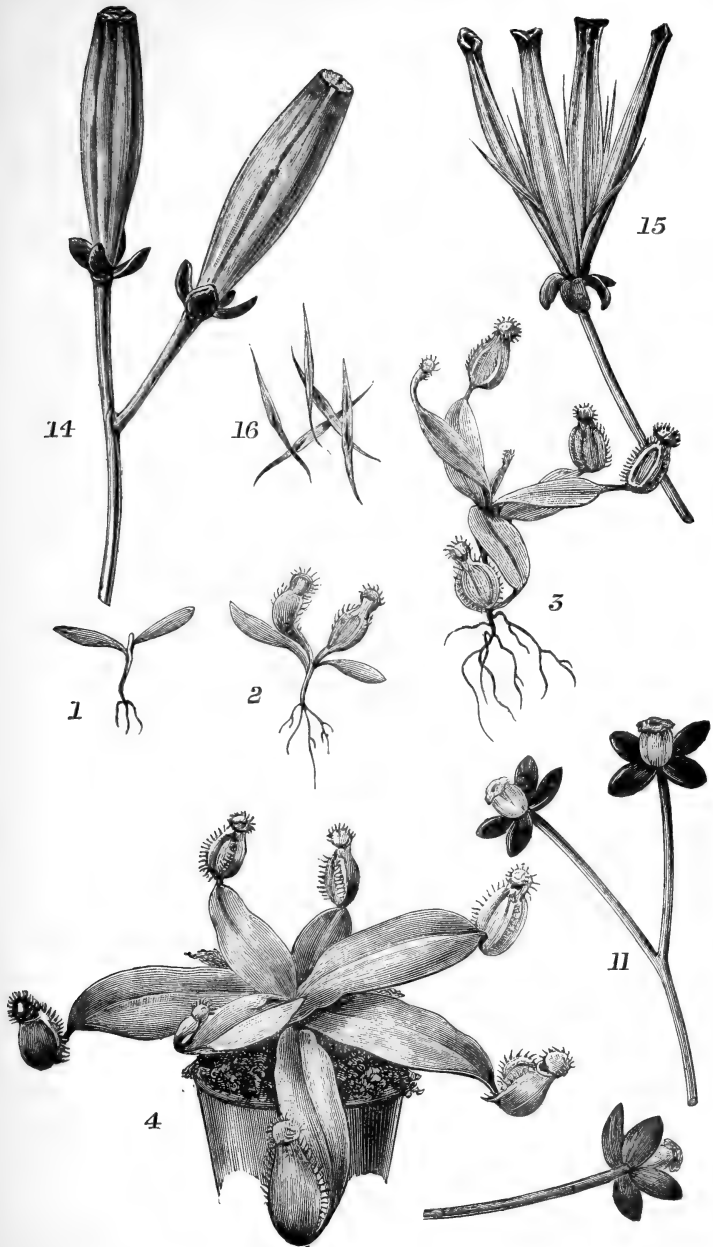


FIG. 57.

and in the shade in the daytime, according to Mr. Spenser St. John, it is frequently not more than 15°–16° C. (59°–62° F.). The plants are enveloped in mist for several hours daily, much in the same manner as the *Odontoglossums* on the higher slopes of the South American Andes. *Sanguinea* occurs on Mount Ophir at 2,000–2,500 ft., and *Khasiana* at 3,000 ft. elevation, facts that should be noted by those concerned in the cultivation of these plants.

The climate of the region, which for present convenience we will call the *Nepenthes* region, is now well ascertained from the long series of meteorological observations carried on at Buitenzorg in Java, at Singapore, Penang, and other places. From the record of these observations it is found that, except at such high elevations as those mentioned, the climate is characterised by the wonderful uniformity of its temperature day and night as well as from one part of the year to another. As a general rule the greatest heat of the day does not exceed 32°–33° C. (90°–92° F.), while it seldom falls during the night below 23° C. (74° F.). The extreme range of temperature at Batavia in three years was found to be only 15° C. (27° F.), the maximum being 35° C. (95° F.) and the minimum 20° C. (68° F.). The usual daily range of the thermometer is, on the average, only a little more than 5° C. (about 10° F.).

During a large part of the year the air of the *Nepenthes* region is nearly saturated with vapour, and owing to the great weight of vapour its high temperature enables it to hold in suspension, a very slight fall in the thermometer is accompanied by the condensation of a large quantity of atmospheric vapour, so that copious dews and heavy showers of rain are produced at comparatively high temperatures and low altitudes. The yearly rainfall ranges from 75 to 80 in. with local deviations. During the wet months of the year it is rare to have many days in succession without some hours of sunshine, whilst even in the driest months there are occasional showers.

Such is the climate in which the *Nepenthes* live in their native home, with the notable exceptions as regards temperature of those species found at a high elevation. Nor does the climate of the habitats of the outlying species differ essentially from that of the equatorial zone, so that the general statement holds good for them too.

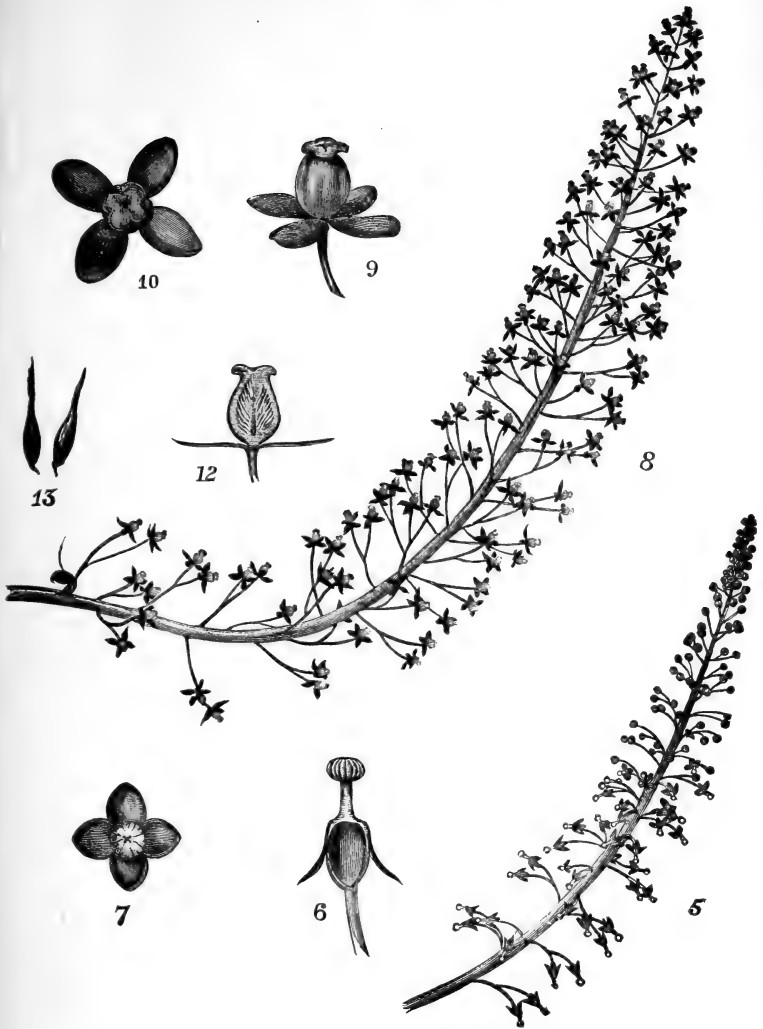


FIG. 58.

DISCUSSION.

Mr. F. W. BURBIDGE having been asked by the Chairman to make a few remarks, said that he could not well express the sense of pleasure and interest Mr. Veitch's practical and splendidly illustrated paper had given to him as to others. His few remarks would be confined to *Nepenthes* as insect traps, and he should say a few words as to the native environment of the rare *Nepenthes* of Kina Balou. He then observed that in Borneo the natives called the pitchers or urns of *Nepenthes* "priok-moniet," or monkey's cooking pots, and they were also well aware of their insect-entrapping proclivities. The peptonised fluid of the half-grown pitchers is also used by the Borneans as a sure specific in cases of indigestion, its action being analogous to that of ripe green figs, cheese, rennet, or the lacto-pepsine remedies not unfrequently used with ourselves. When I was staying with the headman of the Kadyans on the Lawas River, his people often gave me delicious rice, cooked in the pitchers of *N. Hookeriana*, as a sweetmeat to be eaten with jungle fruit and bananas. The question naturally arose as to the practical use these peculiar pitchers were to the plants that bore them. There could be no doubt but that *Nepenthes* pitchers caught and decomposed and digested, in part at least, their insect prey. But why should *Nepenthes* and other insect-catching plants require an extra supply of nitrogenous food obtained in this peculiar manner? Why should *Nepenthes* do this when Palms, Arads, or *Pelargoniums* can obtain food from the water, air, and soil in the usual way? As Mr. Veitch had stated, and as every cultivator knew, all insect-catching plants were characterised by their sparse or weakly root system; and these comparatively few and weakly root fibres were not equal to the strain or demand for food which arose when the plants had to produce flowers and seed. Nature was a hard task-mistress, and sometimes, if not often, she sent forth the fiat to her offspring, "You must either change your mode of life or you must die." This decree had long ago been issued to the *Nepenthes*, which had had to compensate their weak root-action by the peculiar dual development of their foliage leaves. In ordinary leaves absorption of CO_2 and its decomposition under sunlight, by the aid of water and earth salts taken up by the roots, was carried on; but *Nepenthes*

had to do double duty with their leaves. The basal portion carried out the function of ordinary leaves, while the swollen and pitcher-like apical portion was specially modified for the entrapping and decomposition and digestion of insect food. Thus we see that the complete leaf of a *Nepenthes* has "two strings to its bow," and was enabled to exist under peculiar conditions of specialised adaptation to peculiar circumstances and environment. Mr. Veitch had pointed out very clearly that *Nepenthes* pitchers in a half-grown state, and *before* their lids opened, had the power of secreting a limpid fluid, with a slightly acid taste, and a weak odour of roasted apples, due to the malic acid the fluid naturally contained. This fluid has been analysed and is found to contain pepsine in appreciable quantities, so that it is a true digestive fluid analogous to that of our own gastric juice, and there are glands inside *Nepenthes* pitchers towards their base which are also analogous to the secretive and absorptive villi of the human stomach. In a word, the peptonised fluid found in *Nepenthes* urns is specialised for digestive purposes just as is rennet, or as are the peptonised elements found in fresh ripe figs, both long known, and world-wide aids to digestion. *N. ampullacea* is the only *Nepenthes* that has not honey glands to attract insects. Mr. Burbidge next pointed out the way insects were attracted to the urns of *Nepenthes* by a sugary or honeyed secretion near the rims or mouths of the pitchers. This honey, and perhaps also the odour of the peptonised fluid, attracted many kinds of honey-eating insects, which became caught inside the eel-trap-like ascidia. Then decomposition and digestion began, and a rich and nutritious sort of soup was the result. Another thing now occurred, viz., the odour of the decomposing fluid and dead flies became again an attraction for carnivorous or flesh-eating insects, and so a second harvest of victims was secured. Apart from honey-eating and flesh- or carrion-eating flies, there are other insects caught, such as beetles, cockroaches, wood lice, gnats, wasps, daddy long-legs; and ants innumerable are found in the urns of *Nepenthes* both in Borneo and here in hot-houses at home. The formic acid of the ants caught so universally no doubt plays a most important part in intensifying or augmenting the action of the malic acid normally present in the peptonised fluid or gastric juices secreted by these plants as above shown. Of course the ferments set up by both

aerobic and putrefactive bacteria greatly assist in preparing the insect soup ready for absorption and assimilation. It is peculiar that though wasps are sometimes, even if rarely, caught by *Nepenthes*, I have never seen nor heard of a pitcher ever containing either hive or humble bees amongst its captures. He begged to refer those who wished for fuller details to Dr. Vine's paper on "The Physiology of Pitcher Plants," in *Journal of the Royal Horticultural Society*, Vol. XXI., Part I., p. 92.

In referring to the native climatic conditions under which *Nepenthes Rajah*, *N. Edwardsiana*, *N. Lowii*, *N. Villosa*, and *N. Harryana** are found, Mr. Burbidge was peculiarly at home, he having twice ascended the Great Granite Mountain of Kina Balou in N.-W. Borneo, on which alone they exist. On the north, or Marie Parie, spur of this mountain, *N. Rajah* and *N. Edwardsiana* are found at 4,000 feet elevation, but on the great southern spur, in a clearer and more open situation, the species occur in the following order:—*N. Lowii*, epiphytal on trees at 5,000 to 7,000 ft.; *N. Edwardsiana*, 7,000 to 8,000 ft., epiphytal on low mossy trees; *N. Rajah*, 8,000 to 9,000 ft., terrestrial in yellow loam and decomposed granite, with its great basal pitchers resting, and often buried, in dead leaves, moss, and other detritus or debris. *N. Villosa* (terrestrial) and *N. Harryana* (epiphytal, wild hybrid) are both found together with *N. Edwardsiana* at about 8,000 ft. elevation; and *N. Villosa* extends up to 10,000 or 11,000 ft., being in some places found along with the most elevated plants of *N. Rajah*.

The two last-named species are terrestrial, while *N. Lowii*, *N. Edwardsiana*, and *N. Harryana* are more often found in an epiphytal state, their long stems wreathed about the branches of low trees, rooting here and there in the wet moss that clothes them. *N. Rajah* bears the largest and most capacious urns, half-buried in dead leaves and moss, their lower ends resting on the wet ground. *N. Edwardsiana* has pitchers 10 in. to 23 in. in length, elegantly cylindrical, and of a clear light brick-red colour, with green base and a pink frilling of vertical rounded plates

* Named in compliment to Mr. Harry J. Veitch, who has ever taken the greatest interest in the importation and culture of *Nepenthes* of all kinds.

N. Harryana is a natural hybrid between *N. Edwardsiana* × *N. Villosa*, discovered by Mr. Burbidge in 1878, and so named by Sir Joseph Hooker, of Kew. It is the only wild hybrid known, and is exactly intermediate between its parents.

around its orifice. *N. Lowii*, with thick, leathery, green, flagon-shaped pitchers, and an enormous lid over its widened mouth, is the most distinct and peculiar of all. The rim of its crater-shaped mouth is nearly smooth and of a glossy brown colour inside; while the peptic or digestive glands in the lower portion of its urns are the largest and most remarkable of any as yet discovered. The narrowed waist or constricted part of this unique pitcher and its leathery opaque substance render the lower swollen half of the urn perfectly dark—a sort of “black hole of Calcutta” to its insect prisoners. All the pitchers of all the *Nepenthes* literally swarm with millions of the putrefactive forms of bacteria, but the extra darkened character of the urns of *N. Lowii* suits them and their work much better than do those of most other kinds, which admit a certain amount of light from the orifice, and have pitcher coats of a more or less translucent character. As will be seen, the bacteria, wretched but useful little imps of darkness as they are, have a fine time, revelling as they do in the rich, soupy contents of flies, beetles, and ants innumerable. *N. Veitchii* (= *N. lanata*) is remarkable amongst all the pitcher plants as being usually epiphytal on *dead* trunks or branches of trees. Its leaves are two-ranked on the stem, and some of them clasp around the tree so as to hold the plant firmly in its position, which the weak roots alone would not do. This plant growing on dead wood resembles its habitat, in being of a dull brownish colour, and its pitchers mainly catch such beetles and boring insects as exist in decayed timber, such as beetles, and ants innumerable. Its pitchers, and also those of *N. bicalcarata*, are constantly robbed of their prey by insect-eating birds, and also by the quaint little Tarsier, which I saw now and then carefully examining their urns.

*N. bicalcarata** is also visited by a species of ant which is far too clever to be caught in the urns. This ant's object is water, and to obtain this it bores a hole through one of the large sugar-secreting glands of the stalk behind the pitcher, just below the water-line, seeming to know by instinct—or is it experience?—that the water of the pitchers so operated upon will well up to the hole as it does in a syphon pipe. The sluggard is told to go to the ant for wisdom, but we find this clever ant going to the

* Introduced alive by Mr. Burbidge for Messrs. Veitch. It had previously been found by Mr. (now Sir) Hugh Low on the Lawas river.

pitchers for water, without trusting itself to the digestive ferments inside, where of course it would speedily perish.

In speaking of the peculiar climatic conditions existent on Kina Balou, where these noblest and rarest of all the species are only to be seen, Mr. Burbidge alluded to the great mist zone. "This enormous mountain range is about sixty miles from the sea-coast, and the intervening country consists of low ranges of coast hills and rich alluvial plains and marshes. The topmost peak above the great southern spur is 13,700 feet high. It naturally follows that this mountain affords an enormous range of climate and temperature. The thermometer descends to freezing point at the top, and there is sleet, but no snow has been seen. The day temperature of the sea-coast and plains is generally from eighty to ninety degrees in the shade, and perhaps ten degrees lower only on the coldest nights. The great

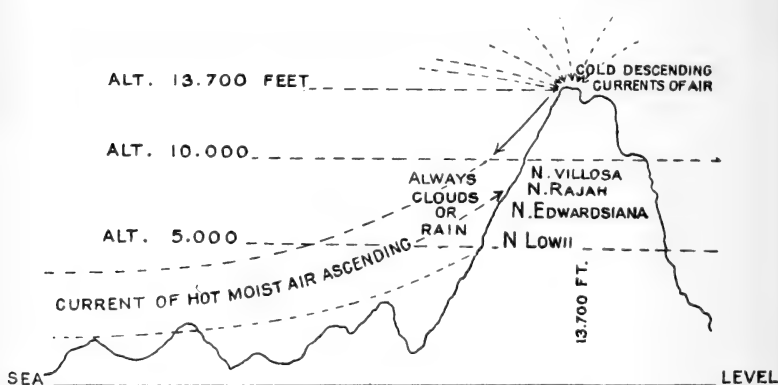


FIG. 59.

Diagram showing hot and cold air currents on the sides of the Kina Balou mountain in Borneo, meeting and condensing at the Nepenthes zone.

granite peaks of this mountain, even at the distance stated, are cold enough and massive enough to attract a current of hot, moisture-laden air from the sea, and this current sets in every day about four or five o'clock. The diagram here given will illustrate what occurs better than words.

"Every night in the year there is a deluge of rain in what I have called the Nepenthes zone of this mountain, that is, from 5,000 to 10,000 feet in altitude, and even if not raining in the

day-time there is in this zone a constant state of what has been

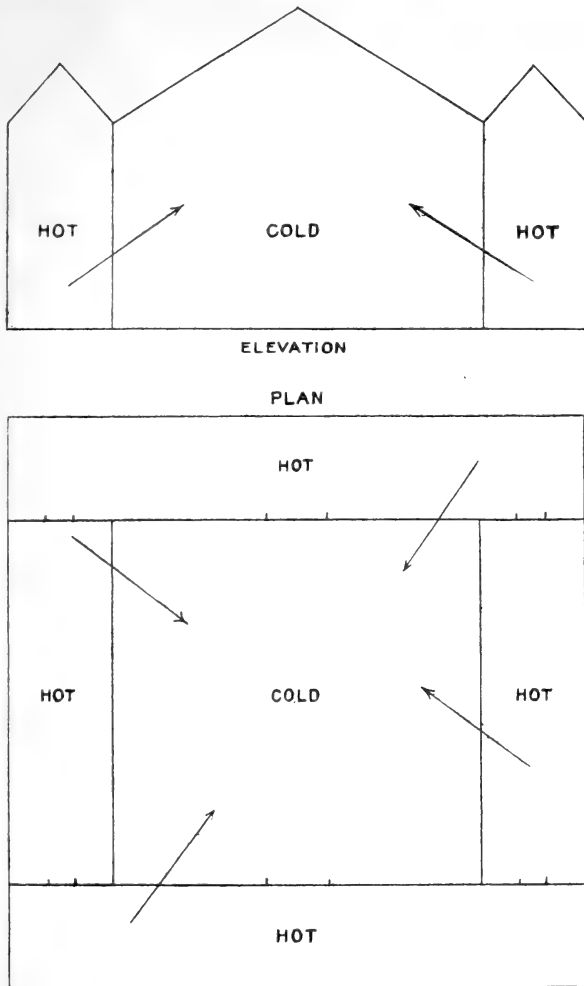


FIG. 60.

Suggested sketch plan for a special Nepenthes house. Hot saturated air to be admitted to cold house, so as to ensure nearly constant dew-point or saturation, and condensation of moisture.

called 'Scotch mist,' or air-clouds condensing into small rain, which wets one to the skin most thoroughly in half an hour.

All the time I was up this mountain (I was there on two occasions in what below were the wet and dry seasons), I never had a dry thread to my back, except at night in the cave with a great bonfire blazing outside. The native guides from the last village on the road, Kiau (altitude 3,000 feet), found the wet and cold (forty-nine to fifty-five degrees Fahr.) on this mountain too much for them, and they became quite paralysed, and finally left for their homes rather than endure the chilly dampness of this Pitcher Plant paradise. At 9,000 to 10,000 feet altitude the trees are low and scrubby, and covered with long moss, filmy ferns (here I saw the trees draped with the rare *Trichomanes pluma*, only seen alive previously by the veteran plant hunter, Tom Lobb), and Lichens or *Usnea*; and creeping, monkey fashion, amongst this vegetation was only another name for a perpetual shower-bath from the branches overhead."

Growing in this comparatively cool temperature, where dew-point or saturation is almost constant, these noble *Nepenthes* not only prove to be exceedingly difficult of transplantation and introduction to Europe, but even when, as in the case of N. Rajah, they are introduced by seeds, they are extremely difficult of cultivation. Plants brought down to the hot plains soon die off, and even if shipped safely in Wardian cases, they cannot withstand the heat of the sea voyage.

In order to grow them successfully, Mr. Burbidge suggested a cold greenhouse surrounded by hot plant-stoves, so arranged that the warm moisture-laden air of the stoves could be admitted to the cold house so as to not only warm it sufficiently, but more especially to ensure a constant state of saturation and condensation of moisture on the stems and foliage of these *Nepenthes*, together with a state of comparative coolness such as naturally exists where they grow.

In suggesting such a special structure for these noble mountain Pitcher Plants, I need scarcely say that it would also be equally useful in ensuring the health and prosperity of many orchids, ferns, and other plants which are naturally found growing wild on the wet and misty mountains of the tropics both east and west, but which defy cultivation in ordinary hot-houses.

PERSIAN CYCLAMEN.

By Mr. W. IGGULDEN.

[Read September 21, 1897.]

No apology will be offered for bringing forward this important subject to-day. It is not too early nor too late, though it would have been more satisfactory to have been able to point to a few well-flowered plants, such as might have been brought here in November or later. Not one among my hearers can, if they are honest, gainsay the fact that Persian Cyclamen rank among the most beautiful, the most serviceable, and the most popular of winter-flowering plants. It is doubtful if they have a rival, and they ought to be considered invaluable alike to private gardeners as well as to trade or market growers. No other plant that I am acquainted with—at any rate, that may be raised so cheaply—can claim to be so profitable. Well-grown Cyclamen are capable of producing flowers freely from October to March inclusive, and there is much to admire in the foliage of the best strains, as well as in the flowers and in their scent. But there is a flaw in the character of this gem of the winter. All appreciate their merits, but how many among us can truthfully say they invariably succeed in growing Cyclamen satisfactorily? Only a limited number—or I know nothing about it. The least that can be said is that there are far more failures than successes. What gardener of an observant turn of mind has not seen batch after batch of miserably stunted plants, with a few leaves and still fewer flowers, that represent the sum total of the various growers' skill in the cultivation of Cyclamen? As a successful as well as an unsuccessful grower, being also one who goes about with his eyes open, and ever bent on improving the shining hour, I venture to offer a few hints as to how failures may be more often avoided in the future.

Persian Cyclamen cannot be grown to anything approaching perfection in the same haphazard fashion that answers fairly well in the case of Cinerarias and Chinese Primulas. From first to last they must have every attention, and ought really to be made quite as much a speciality as are Chrysanthemums with so many growers. Private gardeners, with their multifarious duties and manifold worries, are at a serious disadvantage, especially when we compare their conveniences with those at

the disposal of our most successful trade growers. All the same, some of them grow *Cyclamen* remarkably well, and so might many more if only they went the right way to work. My advice to gardeners generally is either to do them well, or else not to attempt their cultivation at all.

SOWING THE SEED.—When the rage for *Cyclamen* first set in—this following quickly upon the commencement of the wonderful improvement effected by florists in the strains—most of us erred in sowing the seed too late and too thickly. February and March is too late to sow seed, though I have succeeded well with plants resulting from sowing seed early in January. Rather than have the seedlings starving in pans, or, worse still, in small pots in positions not good for them (notably dry shelves in a forcing house, owing to want of a better place), I would prefer raising them in January. Of late years I have sown the seed at least two months earlier, or in October, while noted trade growers not infrequently sow some of their seed as early as August or September, and the rest nearer mid-winter. In each and every case new seed is to be preferred to old, as it germinates more quickly and strongly. From first to last no check ought to be given to the growth of the young plants. If once the roots are badly broken or injured in any way, or if the tiny corms harden prematurely, subsequent progress will inevitably prove most unsatisfactory. Instead, therefore, of raising the plants mustard-and-cress fashion as of old, the more modern plan of sowing thinly, thereby obviating the necessity for pricking out, is much the best.

Fill well-drained pans with a mixture of equal parts of fresh loam and good natural leaf soil, with silver sand added. Make this firm and level, press the seed singly into it about $1\frac{1}{2}$ in. apart each way, and cover with a quarter of an inch or so of fine soil. Arrange these pans on a slate-covered staging in a house where the temperature will range from 60° to 70° , give a gentle watering, cover with squares of glass, and darken this with brown paper or moss. Good seed will germinate, if the soil is kept uniformly moist, in five or six weeks. When this has taken place, remove the shading, and gradually inure the seedlings to the air and light, eventually raising them up near to the glass. Keep them growing in the same temperature they were raised in, but carefully screened from either cold currents of air or extra

dry heat, till sturdy little plants are formed, when rather less heat is desirable. Spray them with tepid water at least once a day, and keep the soil in the pans uniformly moist, but not saturated.

POTTING AND OTHER CULTURAL DETAILS. — Before the roots become interlaced with each other the young seedlings ought to be placed singly into $2\frac{1}{2}$ -in. pots. Seeing that they are well apart in the seed pan, every plant can be lifted out with the point of a label, with a small portion of soil about the roots, and if properly potted no serious check to the plant's progress will be given. For this first potting, soil similar to that in which the seeds were sown may be used. This should not be pressed hard, and the tiny corms ought to show just above the level of the soil. It is now when the private gardener's difficulties become apparent, especially when the first potting takes place in the autumn rather than in March, as would be the case if the seed were sown in December or January. Young Cyclamen, as before hinted, will not thrive in dry surroundings, and soon become stunted and dirty on dry, hot shelves. Where they succeed best is on an ash-covered staging in low span-roofed houses such as trade growers favour; but failing these, plunge the pots closely together in large shallow boxes filled with either fresh moss or cocoa-nut fibre refuse, and block these well up to the light. The soil must be kept on the moist side, taking care not to sour it by over-watering, and on clear days lightly spray the plants overhead in the mornings and afternoons, also shading them from strong sunshine. The temperature may range from 55° to 65° , and the atmosphere of the house should be kept moist.

It is at this stage of their career that many plants are crippled by an attack of a small species of aphid, this happening most often in mixed plant houses. In former years we have been obliged to dip the infested plants in soapy tobacco-water, syringing this off the leaves next day, but nicotine fumes are the present-day remedy.

If necessary to save the foliage from becoming drawn, replunge or rearrange the plants, giving them rather more room than previously. Before they become badly root-bound or weakened by being kept too long in small pots, all worth the trouble should have a shift, this time into 5-in. pots. A rather

richer compost is now desirable. To two parts of sweet, sound loam, add one part each of good leaf soil and powdered dry cow manure with sand, and, if the loam is devoid of fibre, "burn bake" added. Pot moderately firmly, taking care not to damage the leaves nor to unduly bury the corms. Return them to either an ash-covered staging, standing them close together at first, or, if shelves only are available, stand the pots on green moss, and keep this moist. In the case of late-raised plants it will be advisable to transfer them direct from the potting bench to shallow frames on a mild or nearly exhausted hot-bed, placing abundance of ashes or else boards under them to keep worms out of the pots. In either case gentle heat, plenty of light, but no strong sunshine on the plants, a moist atmosphere, and the usual round of spraying are details that must be observed.

During the hottest part of the summer all the plants ought to be thinly arranged in shallow pits or frames sloping away from the south. With me they thrive well in a shallow pit against the west wall of a long span-roofed vinery. Wherever located, the plants must be religiously shaded from strong sunshine, ought not to be exposed to drying winds, and should be sprayed twice on clear days. Be careful not to leave the shading on when it can very well be dispensed with, and avoid crowding the plants, as they are much more ornamental when the leaf-stalks are not unduly lengthened out. In August, not later, some of the strongest plants may be shifted into 7-in. pots, and if everything has gone on satisfactorily, this size will be found none too large. Any flowers that show colour on the plants much before October should be drawn away.

TREATMENT DURING THE FLOWERING PERIOD.—As a rule late in September is soon enough to house *Cyclamen*; and this brings us to another difficulty which trade growers do not share with private gardeners. The majority of the latter have no light span-roofed houses with a central pathway and convenient side-stages for their plants during the winter. But this is what is wanted especially if large batches are grown. But because they cannot have just what they want is no reason why gardeners should muddle their *Cyclamen* among a variety of other greenhouse plants. They must be kept clear of everything else. Let them share a side-stage in a warm greenhouse with *cinerarias* and *primulas*, if need be, at the coolest end. All of these plants are

better kept together in groups. If the stagings are low or the sides of the house high, raise the Cyclamen on inverted pots, keeping every plant clear of its neighbour. In any case keep a close lookout for greenfly, and subject these to nicotine fumes on the slightest signs of an attack. I have seen hundreds of good plants spoilt, ruined in fact, owing to a fortnight's too long delay in dipping or fumigating them.

Water the plants carefully and always round the sides of the pots, not right in the centre of the corms. Plants with their pots well filled with roots will be benefited by occasional supplies of clear soot-water or other weak liquid manure, taking care to keep it off the foliage. All flowers and any leaves to go with them should be drawn clean away from the corms, never cut. When stumps are left, they rot down to the corms, and decay quickly spreads all round. Remove all old flower-stalks in the same way, early seed-saving weakening the plants and being otherwise undesirable. No forcing ought to be attempted, the plants flowering grandly in a temperature of 45° by night to 50° or 55° by day, accompanied by a gentle circulation of warm dry air.

THE SECOND SEASON.—Hitherto my remarks have been strictly orthodox, but when we come to discuss the treatment of Cyclamen that are to flower a second time, then it will be found I am not on the side of our authorities. For several summers I tried the plan of only partially resting the crowns, and planting them with many of their old leaves intact in frames on mild or nearly exhausted hot-beds. Some were also planted in well-prepared soil in both sunny and shady places, with the result in each case of only a limited number of plants succeeding sufficiently well to pay for carefully lifting and re-potting. These experiments, then, were not satisfactory. It was subsequently proved to my satisfaction that completely drying off the plants, re-starting and re-potting, was the best practice, and since adopting it a failure has never taken place. As a matter of fact, my two-year-old plants are frequently of more value to me than well-grown younger ones, and at the present time I could point to numbers of them in perfect leafage and a foot through. Old Cyclamen should never be turned out of doors, but after flowering ought to have water gradually withheld from them prior to literally baking them in the full sunshine. It is the half-hearted drying-off that is most likely to end badly. Lay them on their

sides if they cannot be kept dry in any other way ; and I might add that the best hit I ever made was when a row of plants were laid on their sides on a shelf in a melon-house. They had a thorough



FIG. 61.—THE CYCLAMEN AS INTRODUCED. (*Journal of Horticulture.*)

roasting. When they are thus thoroughly ripened, a cool frame suits them for a time. In June or early in July clean off all dead leaves and dried leaf-stalks, set the pots up closely together and water repeatedly, or till enough has been given to thoroughly moisten the soil. Then, if the frame or pit is kept close and the

corms be syringed morning and evening, they will break into growth over the greater part of their surface. Before this growth is far advanced, all the plants should be overhauled. Turn them out of their pots, pick away as much of the old soil



FIG. 62.—THE CYCLAMEN OF TO-DAY. (*Journal of Horticulture.*)

as possible without breaking the old and already active roots, and return to pots a size or so larger than they were in previously. If returned to the frames or shallow pits arranged thinly on a bed of ashes, watered, sprayed, and shaded as advised

in the case of the young plants, progress will be rapid and highly satisfactory. Instead of old plants being later in flowering than the younger ones, they are, if treated as I have advised, more likely to be earlier, plenty of them with me having their buds very prominent at the present time. These old plants should have more liquid manure than the youngsters, and of course require more room in their flowering quarters. Seed-saving has a weakening effect upon the young corms, and also interferes with their preparation for flowering again.

Allusion has already been made to the injurious effects aphides have upon *Cyclamen*, and the remedy for them answers equally well for thrips. Eel-worms sometimes attack the roots of *Cyclamen*, causing them to swell abnormally, and having the effect of completely paralysing their action. For this reason the pans containing the seed, and the young plants later on, ought never to be placed in near proximity to cucumbers, tomatos, or other plants, the roots of which are very liable to be infested by this nematode. The remedy is Little's Soluble Phenyl diluted freely, a wineglassful, or 2 oz. as measured by an 8-oz. medicine bottle, proving sufficient for three gallons of water. This applied occasionally instead of clear water, proves destructive to the eel-worm, and stimulates rather than retards the growth of the plants.

VARIETIES OF *CYCLAMEN PERSICUM*.—This paper would not be complete without a brief allusion to the good work florists have done in the direction of improving the strains of *Cyclamen*. Most of us remember how poor comparatively the flowers of the strains first distributed were (Fig. 61), and last season my memory was refreshed by a sight in Messrs. Sutton & Sons' Reading Nurseries of a batch of *C. persicum*, which had been imported by that famous firm direct from Persia. Doubtless these suffered by contrast with the grand varieties flowering alongside of them, for though well-grown and full of flower they appeared quite insignificant. By stages our strains have gradually arrived at perfection surely (Fig. 62). It appears, however, that we are soon to have feathered or plumed varieties, and some of our enthusiasts will not be happy till we have monstrosities in the shape of doubled flowers.

Not only are the modern flowers very much larger than the type and the colours beautifully varied, but the plants are also much stronger in constitution than of old, and the foliage so handsome that the present-day *Cyclamen* might well be cultivated for the beauty of their leaves alone.

CAMPANULA BALCHINIANA \times .

THIS plant was one of the curiosities of the last Temple Show, and many people who saw it there, without having the opportunity of a close examination, could scarcely credit that it was a true *Campanula*, but such it is.

The following description appeared at the time in the *Gardeners' Chronicle*:—

“The stems are slender, prostrate, and, like the leaves, densely hirsute, with longish, straight, white hairs. The leaf-stalks are about 4 cent. (say $1\frac{1}{2}$ inch) long, sulcate, expanding into a roundish, coarsely-toothed limb, the disc of which is green, the edges creamy white. When quite young, the leaves are of pale violet colour. The flowers are solitary, on long, slender stalks. The ovary, which in *Campanulas* is inferior, beneath the flower, and very conspicuous, with the sepals and petals spreading from its upper edge, is in these specimens wholly superior and enclosed within the flower. The sepals are represented by five, shortly-stalked, green leaves; the corolla is regular, like that of *C. isophylla*, with a short, open tube, expanding into five flat petals. There are five stamens, with imperfect anthers and a style.

“Learning that this plant had been raised by an eminent botanist, Mr. William Mitten, we appealed to him for further information, which he has been kind enough to give us, as follows:—

“‘The variegated *Campanula* grown by Messrs. Balchin & Son was raised by me from seed taken from *C. fragilis* and *C. isophylla alba*; these, standing in pots, I had endeavoured to intercross, and capsules taken from both supplied the seeds, which were sown together. Excepting the two plants with variegated foliage, which are a little more robust in growth, there was no appearance that *C. isophylla* had any influence on the progeny. There was much variation in the pilosity of the seedlings, but all were blue-flowered, and none different from the ordinary state of *C. fragilis*. I might have applied pollen of *C. turbinata* as well, but there was no trace of that species in the seedlings. No self-sown seedlings have ever occurred to me of *C. isophylla*, which I have only in the white-flowered form; but young plants of *C. fragilis* come up everywhere. I left Messrs. Balchin to put any name to the plant they chose. Not much was anticipated from

this random intercrossing, but I may just mention that in taking up the pollen from a matured anther I have found that when a bit of black sealing-wax is drawn out to a blunt point and (when required to pick up pollen) just rubbed over the sleeve, the wax



FIG. 63.—*CAMPANULA BALCHINIANA* × (Mitten).

Natural size, showing free, leafy, stalked sepals and superior corolla and ovary. In the diagrammatic section, S = sepal, P = petal. Two hypogynous stamens and a superior ovary in section are seen.

becomes sufficiently electrified that loose pollen is caught up, can be seen, and applied where desired, almost without touching a flower.'"

Since the publication of the above note a further opportunity of examining the flowers has occurred. In Messrs. Veitch's Nursery, at Chelsea, in September last, the flowers were as conventionally proper as any *Campanula* flowers could be. The eccentric behaviour of the plant figured (which was forwarded through the kindness of Mr. R. Dean) must therefore be considered as exceptional, though in the writer's "*Vegetable Teratology*," at p. 80, other cases are cited as "occasionally met

with." Be that as it may, the eccentricity is very interesting to the botanist, as it suggests the possibility that what is now exceptional and eccentric was in prehistoric times the normal state of things; in other words, that the hybrid *Campanula*, as here figured, affords an illustration of what naturalists call "reversion." Writing, not from definite knowledge of what goes on in the course of the progressive development of a *Campanula* flower from its initial to its complete condition, but from the analogy presented in countless other plants, it may be inferred that all *Campanulas* in the course of their existence present for a time an initial arrangement of parts like that shown in the figure. This relative simplicity of construction and arrangement is, however, soon lost. Growth here, growth there occurs, but in unequal measure, and results in the greatly modified flower usually seen. But if the growth here and the growth there be equal, or in regular proportion, then a correspondingly regular flower is produced. There can be no question about the facts—the progression from the simple to the complex in the normal flower, the arrest or suppression of that progress in the malformed bloom—but we are almost entirely in the dark as to the reason why the floral development was checked, and made to assume a simpler character. We may say it was brought about by a change in the process of nutrition occurring at a particular stage of the plant's growth. But that is only a conjectural assertion. It may be true or it may not be. The cultivator may be inclined at first to consider any such speculations as outside of his province and vein. But a moment's consideration will show him that if we did but know the causes producing such changes we should, in all probability, have the power of inducing them ourselves, and of doing systematically, and with more or less certainty, what now, if done at all, is effected in a fortuitous, haphazard manner.

In the present instance hybridisation may fairly be assumed to have upset the balance of "nutrition" and "construction." But if so, why in one plant and not in the others? It is as well to say, "We don't know!" Nevertheless, we trust some hybridist will, with greater precautions to ensure certainty of result, transfer the pollen of *C. fragilis* on to the stigma of *C. isophylla*, and *vice versâ*, and having noted his results will communicate them to the R.H.S. Scientific Committee.

M. T. M.

REPORT ON POTATOS AT CHISWICK, 1897.

Sixty-three varieties of Potatos were grown for trial, mostly new ones, but including a few of the best varieties of recent introduction for comparison. The ground had been occupied with fruit trees for many years, and the deep working necessary to get out the roots of the trees made the soil admirably suited for the crop, which was a general success. The collection was examined by the Fruit and Vegetable Committee on two occasions, on August 5 and on September 8, the former date being for the early and the latter for the late varieties. The cooking qualities of a few promising varieties were also tested on November 5.

F.C.C. = First Class Certificate.

A.M. = Award of Merit.

× × × = Highly Commended.

× × = Commended.

1. Beauty of Hebron (Sutton).—The soil at Chiswick does not suit this variety, it being weak in growth and the crop light.

2. Blue Beard (Hurst).—Round, blue, rough skin, eyes rather deeply set; medium size; moderate crop, slightly diseased; tall haulm. Late.

3. Bovee (Henderson, New York).—Kidney, pale pink, rough skin, eyes full; large; moderate crop, free from disease; tall haulm. Late.

4. Brenchin Castle (Andrew).—Round, white, eyes full; medium size; heavy crop, free from disease; tall haulm. Late.

5. Brumfield's No. 1 (Brumfield).—Kidney, white, eyes full; large and good shape; very heavy crop, slightly diseased; moderate haulm. Late.

6. Brumfield's No. 2 (Brumfield).—Kidney, white, eyes full; the crop was great, but the tubers too small to be useful; slightly diseased. Late.

7. Cardinal, × × × September 8, 1897 (Lidstone).—Round, red, rough skin, eyes shallow; large; very heavy crop, free from disease; moderate haulm. Late.

8. Diamond Jubilee No. 4 (Dibbens).—Round, white; extraordinary crop, tubers too small for use; diseased. Late.

9. Diamond Jubilee, $\times \times$ November 5, 1897 (Vert).—Kidney, white, eyes full; medium size; heavy crop; moderate haulm. Late.

10. Diamond Jubilee (Andrew).—Round, white, eyes full, rough skin; medium size; good crop, free from disease; moderate haulm. Late.

11. Dr. Kitchen (Dibbens).—Roundish oval, white, eyes full; large and handsome; moderate crop, free from disease; tall haulm. Late.

12. Early Bird (Turner).—Kidney, white, eyes full; large; very heavy crop, free from disease; short haulm. Early.

13. Early Crimson Flourball (Daniel).—Round, red, eyes deep; large; rather a poor crop, free from disease; tall haulm. Midseason.

14. Early Eclipse (Fidler).—Kidney, white, eyes full; large; heavy crop, much diseased; short haulm. Early.

15. Early Favourite (Palmer).—Kidney, white, eyes full; very heavy crop, diseased; short haulm. Early.

16. Early Monarch (Harrison).—Kidney, white, eyes full; medium size; heavy crop, free from disease; moderate haulm. Early.

17. Early Short-top (Harrison).—Kidney, white, eyes shallow; very large; good crop, free from disease; short haulm. Early.

18. Elcombe's Britannia (Nutting).—Kidney, white, eyes full; good crop, slightly diseased; short haulm. Early.

19. Epicure (Sutton).—Round, white, eyes deeply set; large; moderate crop, free from disease; short haulm. Second early or midseason.

20. Fyvie Flower, **F.C.C.** September 2, 1886 (Ashelford).—Kidney, white, eyes full, skin rough; handsome, medium size; heavy crop, free from disease; moderate haulm. Early.

21. Famous, **A.M.** July 31, 1896 (Ross).—Oval to kidney, white, eyes full; large; very heavy crop, free from disease; moderate haulm. Early.

22. Goldfinder (Carter).—Oval, white, eyes full; medium size; good crop, slightly diseased; tall haulm. Late.

23. Guinivere (Fletcher).—Round, white, eyes full; skin rough; good crop, free from disease; tall haulm. Midseason or late.

24. Hallamshire Hero (Hughes).—Round to oval, white, eyes full, skin rough; heavy crop, free from disease; tall haulm. Late.

25. Hampshire County Alderman (Dibbens).—Round, white, eyes deeply set; very large; very heavy crop, free from disease; tall haulm. Late.

26. Harbinger, **A.M.** August 5, 1897 (Sutton).—Round, white, eyes full; medium size; very heavy crop, free from disease; short haulm. Very early. The quality was excellent when cooked.

27. Howlett's Early (Hurst).—Roundish oval, white, eyes shallow; large; heavy crop, slightly diseased; moderate haulm. Early.

28. Horsford's Seedling, $\times \times \times$ September 8, 1897 (Horsford, Vermont, U.S.A.).—Roundish oval, white, eyes full; large; very heavy crop, free from disease; short haulm. Mid-season.

29. Improved Royal Jersey Fluke (Ashelford).—Long kidney, white, eyes full; very large; moderate crop, much diseased; tall haulm. Late. Same as International.

30. Ivo, $\times \times \times$ September 8, 1897 (Curtois).—Kidney, white, eyes full; medium size; very heavy crop, free from disease; tall haulm. Midseason. This variety was of first-rate flavour when cooked.

31. Lewis's Red (Butcher).—Round, red, uneven in size, eyes shallow; moderate crop, free from disease; tall haulm. Late.

32. Leece's Seedling (Leece).—Roundish oval, eyes full, rough skin; large; good crop, free from disease; tall haulm. Late.

33. Lincolnshire Ashleaf (Wright).—Kidney, white, eyes full; medium size, good crop, free from disease; short haulm. Early.

34. Morning Star (Cooper).—Kidney, white, eyes full; large; good crop, free from disease; short haulm. Late.

35. Ne Plus Ultra (Sutton).—Roundish oval, white, eyes shallow; large; heavy crop, free from disease; moderate haulm. Rather early.

36. New Early Frame (Hurst).—Not a success, most of the tubers failing to grow.

37. Ninety Fold (Sutton).—Kidney, white, eyes full; medium to large; very heavy crop, slightly diseased; short haulm. Midseason.

38. No. 71 (J. Veitch).—Round, white, eyes full; good crop, free from disease; moderate haulm. Midseason.

39. Perfection (Sutton).—Roundish oval, white, eyes full; large; heavy crop, free from disease; short haulm. Late.

40. Pierremont (Hurst, Kent & Brydon).—Round, white, eyes deeply set; large; very heavy crop, free from disease; moderate haulm. Late.

41. Pierce's Red Kidney (Benbow).—Kidney, purplish red, eyes full; very heavy crop, free from disease; tall haulm. Late.

42. Pierce's Success (Benbow).—Roundish oval, very white, eyes full; moderate crop, free from disease; tall haulm. Late.

43. Pink-eyed Perfection (Wiles).—Round, white, with pink eyes somewhat deeply set; moderate crop, free from disease; tall haulm. Late.

44. Queen's Diamond Jubilee No. 2 (Dibbens).—Roundish oval, pale pink, eyes full; moderate crop, free from disease; moderate haulm. Midseason.

45. Queen's Diamond Jubilee No. 3 (Dibbens).—Kidney, white, rough skin, eyes full; heavy crop, free from disease; tall haulm. Late.

46. Queen's Diamond Jubilee Garnet (Dibbens).—Kidney, white; most extraordinary crop of very small tubers, none of which were large enough for use; tall haulm. Late.

47. Ringleader (Sutton).—Kidney, white, eyes full; rather small; good crop, free from disease; short haulm. Early.

48. Rose Lily (Ashelford).—Roundish oval, white, eyes shallow; medium size; moderate crop, free from disease; short haulm. Early.

49. Satisfaction, **A.M.** September 10, 1895 (Sutton).—Roundish oval, white, eyes full, rough skin; very heavy crop, free from disease; tall haulm. Late.

50. Seedling (Reven's).—Kidney, white, eyes full; moderate crop, free from disease; tall haulm. Late.

51. Seedling (Harraway & Scott).—Oval to kidney, white, eyes full; heavy crop, free from disease; tall haulm. Late.

52. Seedling (Bankes).—Roundish oval, white, eyes full,

rough skin, and handsome ; heavy crop, free from disease ; tall haulm. Late.

53. Supreme, $\times \times$ November 5, 1897 (Sutton).—Kidney, white, eyes full ; heavy crop, free from disease ; moderate haulm. Midseason.

54. Sir Lancelot (Fletcher).—Round, red, large, eyes shallow, rough skin ; heavy crop, free from disease ; moderate haulm. Late.

55. Sutton's A1 (Sutton).—Roundish oval, pale yellow, eyes shallow ; very heavy crop, free from disease ; moderate haulm. Early.

56. Syon Maincrop (Wythes).—Roundish oval, white, large, rough skin, eyes shallow ; very heavy crop, free from disease ; tall haulm. Late.

57. The Topman (Sim).—Kidney, white, eyes full, rough skin ; heavy crop, much diseased ; short haulm. Early.

58. The Topper (Gilbert).—Roundish oval, white, eyes full ; good crop, free from disease ; tall haulm. Late.

59. Triumph, **F.C.C.** September 12, 1893 (Sutton).—Round to oval, white, eyes full ; very heavy crop, free from disease ; tall haulm. Late.

60. Waite's Seedling No. 1 (Waite).—Round, white, eyes full, rough skin ; heavy crop, free from disease ; moderate haulm. Late.

61. White Beauty of Hebron (Sutton).—Similar to Beauty of Hebron, except in colour, and a heavier cropper at Chiswick.

62. Windsor Castle, **F.C.C.** September 12, 1893 (Sutton).—Roundish oval, white, eyes shallow, rough skin, handsome ; very heavy crop ; moderate haulm. Late.

63. Wythes' Seedling Kidney (Wythes)—White, eyes full ; large ; moderate crop, free from disease ; rather short haulm. Midseason.

Experiments were made with sixteen varieties to test (1) the difference between earthing and non-earthing ; (2) the rubbing away of all sprouts, and the careful preserving of all sprouts. Thus (1) one row was earthed up, one row non-earthed up ; (2) one row of the seed tubers was planted with the sprouts intact, and one row with all the sprouts rubbed off—the same variety being of course employed in each case. In the whole of the sixteen varieties so tested, there was absolutely no difference

apparent in either experiment, either in the size of the tubers or in the weight of the crop. In fact the only difference was that those tubers planted without sprouts were a little later in maturing their crop. The following varieties were experimented with:—Bonus, Bonnie Blush, Britannia, Cockerill's Seedling, Congress, Conqueror, Early Ashleaf, Late Perfection, Magistrate, Murphy, Nonpareil, Perfection, Reine des Polders, Saxon, Triumph, and Veitch's No. 73.

REPORT ON BORECOLE AND KALES GROWN AT CHISWICK, 1897.

Forty-seven stocks of the above were received for trial, and sown March 29. In every case the germination was good, and the young plants were put out three feet apart each way, and two rows of each, on soil that had grown no previous vegetable crop for very many years, the ground having been occupied with very old fruit trees. The trees were removed, and the ground trenched from two to three feet deep and well manured during the spring of 1897. The plants all made excellent growth up to the middle of July; then a fungus attacked the foliage and stems of the Asparagus, Buda, and Ragged Jack section, causing the whole to rot, and creating a great stench, whilst the Curled Kales planted side by side with them were perfectly healthy and free from attack.

F.C.C. = First Class Certificate.

A.M. = Award of Merit.

× × × = Highly Commended.

× × = Commended.

1, 2, 3. Asparagus (Nutting, Hurst).—All three stocks diseased.

4, 5, 6. Buda (Nutting, J. Veitch, Hurst).—All diseased.

7. Brydon's Selected Green Curled, × × × November 5, 1897 (Kent & Brydon).—Medium height; light green leaves; strong growth. The most densely curled variety in the collection. A fine strain.

8. Chou de Milan, × × × November 5, 1897 (Watkins & Simpson).—Tall, branching, vigorous, not curled. An excellent strain of this hardy variety.

9. Chou de Burghley (Watkins & Simpson).—Diseased.

10. Couve Tronchuda (Watkins & Simpson).—Dwarf, resembling a loose Cabbage; fine flavour when cooked. Most suited for autumn cutting, as it is rather tender.

11, 12, 13. Cottagers (Turner, Hurst, J. Veitch).—All three stocks diseased.

14. Cottagers, $\times \times \times$ November 5, 1897 (Watkins & Simpson).—Tall, branching; very vigorous, and free from disease. A very fine strain.

15. Culzean Castle, $\times \times \times$ November 5, 1897 (Hurst).—Medium height; dark green leaves, densely curled; vigorous. An excellent stock of this favourite variety.

16. Cuthbertson's Famous Strain, $\times \times \times$ November 5, 1897 (Cuthbertson).—Very dwarf; dark green leaves, densely curled; vigorous. A very good strain.

17. Delaware Purple (Hurst).—Diseased.

18. Dobbie's Dwarf Curled (Hurst).—Medium height; dark leaves, densely curled; vigorous.

19. Drumhead (Hurst).—Very dwarf, with large hearts; leaves well curled; vigorous. Some of the plants were much diseased.

20. Dwarf Green Curled (Nutting).—Dwarf; leaves well curled; vigorous. A good stock of this well-known variety.

21. Dwarf Green Curled (Hurst).—Stock not true.

22. Dwarf Purple, $\times \times$ November 5, 1897 (Dobbie).—Very dwarf; long dark purple leaves, well curled; hardy and vigorous.

23. Exquisite Dwarf, Purple Curled, $\times \times$ November 5, 1897 (Barr).—Same as No. 22.

24. Green Curled (Watkins & Simpson).—A taller form of No. 18.

25. Hearting (Nutting).—Dwarf; leaves well curled; vigorous, but showed no signs of hearting.

26. Improved Hearting (Harrison).—Medium height; leaves very large and coarse; very vigorous, but irregular in growth.

27. Improved Hearting (Yates).—A dwarf form of No. 26.

28. Lapland (Nutting).—Diseased.

29. Late Hearting, $\times \times \times$ November 5, 1897 (Hurst).—Very dwarf; leaves densely curled; large hearts. A fine and true stock.

30. Late Curled (J. Veitch).—Dwarf; leaves moderately curled; branching vigorous. Good stock.

31. Moss Curled (Watkins & Simpson).—Tall; large leaves, well curled; branching.

32. New Hearting (Watkins & Simpson).—Dwarf; leaves moderately curled; medium-sized hearts; vigorous.

33. Phœnix (Hurst).—Diseased.

34. Purple Buda (Nutting).—Diseased.

35, 36, 37. Ragged Jack (Hurst, Watkins & Simpson, Nutting).—All the stocks badly diseased.

38. Read's Hearting, **F.C.C.** April 24, 1883 (Yates).—Medium height; well curled; irregular in growth and requires further selection.

39. Selected Curled (Yates).—Dwarf; densely curled leaves. A very good strain, but rather irregular in growth.

40. Selected Variegated (Dobbie).—Requires more selection.

41. Syon Branching (Wythes).—Much diseased.

42. Tall Green Curled (Hurst).—Tall; large leaves, well curled; strong in growth and rather coarse.

43. Tall Curled (J. Veitch).—*See* No. 42.

44. Variegated, **A.M.** February 12, 1889 (J. Veitch).—Medium height; with beautifully marked leaves. The finest stock of this variety in the collection.

45. Victoria, $\times \times \times$ November 5, 1897 (Dobbie).—Medium height; dark green densely curled leaves; vigorous. A very fine strain.

46. Variegated (Watkins and Simpson).—*See* No. 40.

47. Waite's Dwarf Hearting (Cooper).—Dwarf; irregular in foliage and growth. Requires further selection.

REPORT ON MISCELLANEOUS VEGETABLES GROWN FOR TRIAL AT CHISWICK, 1897.

AUBERGINE. Sown March 17.

Solanum Melongina (syn. Maroo Baingau) (Bonavia).—A very dwarf and fruitful variety of Aubergine, of excellent flavour when cooked according to Dr. Bonavia's receipt.

BEET. Sown June 3.

1. Dropmore Selected (Herrin).—Roots pyriform, dark red, medium size, with very short dark foliage.

2. Nursery Beet (Long).—Roots long, dark red, rather large, with moderate dark foliage.

3. Dewar's Northumberland Short-top (Oliver).—Roots long, dark red, fine shape, with very short dark foliage.

BRUSSELS SPROUTS. Sown April 9.

1. Allsop's (Allsop).—Medium height; sprouts of moderate size, much inclined to burst.

2. Holborn Exhibition (Carter).—Tall; sprouts very large and firm, leaves large and spreading.

3. The Loades (Long).—Very similar to No. 2.

CUCUMBERS. Sown April 12.

1. Seedling (J. Goody).—A cross between Rollison's Telegraph and Duke of Edinburgh. Large, with prominent dark spines, and rough appearance. Heavy cropper.

2. Everard's Prolific (Kent & Brydon).—Too closely resembles Lockie's Perfection to be considered distinct.

CARROTS. Sown May 3.

1. Brydon's Adiantum-leaved (Kent & Brydon). Foliage very handsome, and useful for decorative work. Roots not of good quality.

2. Red Elephant (Carter).—Roots long, red, handsome, but not considered superior to varieties already in commerce.

CABBAGES. Sown April 9.

1. Cook's Early (Harrison).—Large; heads firm, bluntly conical, with a large spread of outer leaves. Stems short.

2. Cropp's Early (Harrison).—Medium size; heads firm, roundish, standing well without bursting. Moderate spread of outer leaves. Stem short.

3. Dickson's Perfection (Dicksons).—Medium to large; heads firm, bluntly conical, with a small spread of outer leaves.

SCARLET RUNNER BEANS. Sown June 2.

1. Rivenhall Giant Painted Lady (Cooper, Taber & Co.).—A very good selection of the popular Painted Lady.

2. The Jubilee (Wiles).—Pods long, of good shape, and freely produced. Not considered any improvement on existing varieties.

3. Waltham French Bean (Sharpe).—This is a climbing French Bean of moderate height, producing an immense crop of short pods.

PARSLEY. Sown April 9.

New Gem (Cuthbertson).—A good strain of the ordinary type.

REPORT ON TEA, HYBRID TEA, AND NOISETTE ROSES.

GROWN IN THE OPEN GROUND AT CHISWICK, 1897.

A collection of fifty-six varieties was grown in ordinary soil. The plants were received in December 1894, but they did not grow sufficiently well to merit inspection during the summer of 1895. In 1896 they grew well, but, as the summer was so hot and dry, the Floral Committee decided that it would be advisable to continue the trial in 1897. This year the plants grew well, flowered abundantly, and were free from mildew and insect pests. The Committee inspected the growing plants on several occasions, and recommended Awards of Merit to nine varieties.

F.C.C.—First Class Certificate.

A.M.—Award of Merit.

1. Alba Rosea (Tea) (Prince).—Vigorous grower; very free, flowering; flowers cream white, shaded pink in the centre. Beautiful in the bud state.

2. Amazone (Tea) (Prince, Rumsey).—Moderate grower; flowers deep lemon yellow, changing to sulphur yellow with age.

3. Anna Olivier (Tea) (Mount, Rumsey).—Moderate grower; flowers large, of good form, flesh colour, reverse of petals shaded rose.

4. Augustine Halem, **A.M.** July 5, 1897 (Hybrid Tea) (W. Paul).—Vigorous grower, of good habit; very free flowering; flowers large, globular, rosy carmine.

5. Bouquet d'Or (Noisette) (Dicksons).—Very vigorous grower; free flowering; flowers large, full, yellow, shaded rose.

6. Catherine Mermet (Tea) (Rumsey).—Good grower; free flowering; flowers large, full, globular, pale pink, suffused with yellow.

7. Clara Watson, **A.M.** April 7, 1896 (Hybrid Tea) (Prince).—Vigorous grower; flowers very large, of excellent form, pale pink, salmon centre. A continuous bloomer.

8. Comtesse de Breteuil (W. Paul).—Did not flower.

9. Comtesse de Nadaillac (Tea) (Veitch, Prior).—Moderate grower; flowers large, of good form, rosy salmon pink, deeper towards base of petals. Very beautiful.

10. Comtesse Riza du Parc (Tea) (Rumsey).—Vigorous grower; free flowering; flowers large, full, bright rose changing to pink.

11. Edmond Sablayrolles, **A.M.** July 5, 1897 (Tea) (Veitch).—Good grower; very free flowering; crimson, shaded with carmine. Beautiful in bud state. Opens wide, and soon fades.

12. Ernest Metz (Tea) (Prince).—Vigorous grower; free flowering; flowers large and of good form, rosy carmine, brighter centre. Very handsome.

13. Ethel Brownlow (Tea) (Prior).—Not a very strong grower; flowers of good shape, rose, shaded yellow. Very distinct.

14. Etendard de Jeanne d'Arc, **F.C.C.** April 22, 1884 (Tea) (Rumsey).—Vigorous grower; free flowering; flowers cream white, touched with pink.

15. Etoile de Lyon. **F.C.C.** May 12, 1885 (Tea) (Rumsey, Dicksons, Veitch).—Vigorous, sturdy grower; very free flowering; flowers large, of good form, sulphur yellow, brighter in centre. Stands drought well.

16. Francesca Kruger, **A.M.** July 5, 1897 (Tea) (Mount, Prince, Rumsey, Dicksons).—Vigorous grower; very free flowering; flowers of good form, large, coppery yellow, shaded with rose.

17. Germaine de Mareste (Tea) (W. Paul).—Vigorous grower; moderately free flowering; flowers large, full, perfect shape, cream white, centre shaded salmon.

18. Grand Duc de Luxembourg, **A.M.** May 19, 1896 (Hybrid Tea) (W. Paul).—Very vigorous grower; very free flowering; flowers large, rosy red, bright centre, exterior of petals brilliant lake. A very fine variety.

19. Gustave Regis, **A.M.** June 21, 1892 (Hybrid Tea) (Dicksons).—Vigorous grower; flowers canary yellow, exterior of petals deeper yellow, distinct and beautiful. Early bloomer.

20. Homère (Tea) (Dicksons).—Good grower; very free

flowering; flowers soft pink, petals edged with rose. A distinct variety, but seldom opening satisfactorily.

21. Hon. Edith Gifford, **A.M.** July 5, 1897 (Tea) (Veitch).—Vigorous grower; flowers large, full, flesh colour, shaded pink. Continuous bloomer, and stands drought well.

22. Innocente Pirola, **A.M.** July 5, 1897 (Tea) (Mount, Prior, Veitch, Prince).—Vigorous grower; exceptionally free flowering; flowers large, globular, cream white, deeper centre. Very beautiful in the bud state.

23. Isabella Sprunt (Tea) (Dicksons, Rumsey).—Good grower; very early and free flowering; flowers sulphur yellow. A first-rate buttonhole Rose.

24. Jean Ducher (Tea) (Rumsey).—Moderately free grower; flowers large, globular, full, pale lemon, shaded with rose.

25. Le Soleil (Tea) (W. Paul).—Vigorous grower; flowers large, full, canary yellow.

26. Ma Capucine (Tea) (Prior).—Moderate grower; rather shy bloomer; flowers coppery yellow, shaded red.

27. Madame Bérard (Tea) (Dicksons).—Moderate grower; free flowering; flowers large, well formed, salmon yellow.

28. Madame Caroline Kuster (Noisette) (Rumsey).—Vigorous grower; moderately free flowering; flowers large, canary yellow, exterior of petals pink.

29. Madame Charles (Tea) (Rumsey).—Vigorous grower; free flowering; flowers large, globular, clear apricot yellow. Beautiful in the bud state.

30. Madame Chedane Guinoisseau (Tea) (Rumsey).—Moderate grower; free flowering; flowers canary-yellow, deeper centre. A first-rate buttonhole Rose.

31. Madame de Watteville (Tea) (Dicksons, Prince).—Moderate grower; flowers cream white, edged with rose. Exceedingly pretty and effective.

32. Madame H. Jamain (Tea) (Rumsey).—Vigorous grower; flowers large, white, coppery yellow centre.

33. Madame Lambard (Tea) (Dicksons, Rumsey, Mount).—Moderate grower; very free flowering; flowers large, full, splendid shape, rich pink, flushed with rose. Early bloomer.

34. Madame Margottin, **F.C.C.** April 2, 1873 (Tea) (Rumsey).—Vigorous grower; flowers lemon yellow, shaded with pink in the centre.

35. Madame Pernet Ducher, **A.M.** July 5, 1897 (Hybrid Tea) (W. Paul).—Vigorous grower; very free flowering; flowers large, canary yellow, varying to pure white. A continuous bloomer.

36. Madame P. Perney (Tea) (W. Paul).—Moderate grower; very free flowering; flowers saffron yellow, varying to pale yellow. A good late bloomer.

37. Madame Victor Caillet (Tea) (W. Paul).—Vigorous grower; rather shy bloomer; flowers coppery rose, shaded with salmon. Late bloomer.

38. Madeline d'Aoust (Tea) (Veitch).—Moderate grower; rather shy bloomer; flowers pale yellow, suffused with pink.

39. Mdle. Henriette de Beauvau (Tea) (W. Paul).—Very vigorous grower; flowers large, full, rich yellow. A first-rate autumn bloomer.

40. Marie Guillot (Tea) (Dicksons).—Very vigorous grower; very free flowering; flowers large, white, shaded with delicate pink in the centre. Good late bloomer.

41. Marie van Houtte, **A.M.** July 5, 1897 (Tea) (Mount Dicksons).—Good grower; very free flowering; flowers of good form, sulphur yellow, outer petals rose. Very distinct and handsome. Continuous bloomer. One of the very best of garden Roses.

42. Niphetos (Tea) (Prior, Veitch, Dicksons).—Weak grower; buds long, white, shaded with lemon in centre. Not a success in the open ground.

43. Paul Narbonnand, **A.M.** July 27, 1897 (Tea) (W. Paul).—Vigorous grower; rather shy bloomer; flowers large, full, bright pink.

44. Perle des Jardins (Tea) (Veitch).—Moderate grower, free flowering; flowers large, full, canary yellow, centre deep; yellow.

45. Pink Rover (Hybrid Tea) (W. Paul).—Very vigorous grower; free flowering; flowers large, full, of good form, pale pink, deeper centre. Very handsome and sweet scented.

46. Princess of Wales, **F.C.C.** June 12, 1883 (Tea) (Prince).—Moderate grower; free flowering; flowers large, soft yellow, flushed with rosy pink. A grand variety.

47. Rubens (Tea) (Rumsey).—Vigorous grower; very free flowering; flowers of excellent form, white, suffused with rose-yellowish centre.

48. Safrano (Tea) (Rumsey, Dicksons).—Moderate grower; very free flowering; flowers rich apricot changing to buff. A beautiful buttonhole Rose.

49. Souvenir de Paul Néron, **A.M.** July 5, 1897 (Tea) (Mount, Rumsey, Veitch).—Vigorous grower; free flowering; flowers large, of good form, cream white, margined and shaded with rose pink. A good autumn bloomer.

50. Souvenir de S. A. Prince, **F.C.C.** June 11, 1889 (Tea) (Veitch).—Moderate grower; free flowering; flowers white, suffused with pink on the outer petals.

51. Sunset, **F.C.C.** June 24, 1884 (Tea) (Dicksons).—Vigorous grower; free flowering; flowers of good form, deep apricot yellow. A good late-flowering variety.

52. The Bride, **F.C.C.** March 8, 1887 (Tea) (Dicksons).—Moderate grower; moderately free flowering; flowers white, suffused with pink. Better suited for pot culture.

53. The Meteor (Tea) (Veitch).—Vigorous grower; free flowering; flowers large, deep crimson. Very distinct.

54. Viscountess Folkestone (Hybrid Tea) (Veitch).—Vigorous grower; free flowering; flowers large, creamy pink, salmon pink centre. A most beautiful garden Rose.

55. White Lady, **A.M.** May 3, 1892 (Hybrid Tea) (W. Paul).—Vigorous grower; very free flowering; flowers large, full, flesh colour changing to cream white. Very early bloomer.

56. W. A. Richardson, **A.M.** July 5, 1897 (Noisette) (Prior, Dicksons).—Vigorous grower; flowers borne in dense clusters, rich apricot fading to pale yellow. Good as a bud, but not satisfactory otherwise.

REPORT ON SUMMER AND EARLY-FLOWERING CHRYSANTHEMUMS.

GROWN IN THE OPEN GROUND AT CHISWICK, 1897.

A collection of 141 stocks of Chrysanthemums was planted in fairly rich soil on a sunny border on May 26, the distance between the rows being three feet, and the plants two feet apart in the rows. The whole of the collection made excellent growth, showing the true character of each variety. They made a magnificent display of bloom, and were greatly admired by visitors to

the gardens. The object of the trial was to determine the height, habit, time of flowering, and usefulness of each variety for decorative border purposes. All the varieties were grown naturally, one stake being supplied to each plant to keep it in place. The collection was examined by the Floral Committee on five occasions, who recommended four Awards of Merit and highly commended thirty-nine.

F.C.C.=First Class Certificate.

A.M.=Award of Merit.

× × × =Highly Commended.

1. Abbé Duale (Jap.) (Jones).

2. A. Gabey (Jap.) (Jones).

These varieties had not come into flower on October 25.

3. Albert Chausson (Jap.) (Dobbie).—Height 4 feet; loose habit; flowers large, orange red, yellow reverse. In flower October 1.

4. Alex. Defour (Jap.) (Divers).—Height 2 feet 6 inches; moderately free flowering; flowers flat, rich purple. In flower October 19.

5. Alice Butcher (Pom.), × × × October 4, 1897 (Dobbie, Divers, Cannell, Barr).—Height 2 feet 6 inches; good habit; very free flowering; flowers red, suffused with orange. In flower September 23.

6. Ambrose Thomas (Jap.) (Jones).—Height 3 feet 6 inches; straggling habit; flowers large, crimson purple. In flower September 18.

7. American Star (Ref.) (Jones).—Height 2 feet; bushy habit; very free flowering; flowers blush pink, tinged with purple. In flower September 25.

8. Anastasia (Pom.), × × × September 17, 1897 (Barr).—Height 20 inches, very bushy; very free flowering; flowers rosy purple. In flower August 30.

9. Arthur Crepey (Jap.) (Dobbie).—Height 2 feet 6 inches, good habit; flowers canary yellow, outer petals sulphur yellow. In flower September 4.

10. Baronne G. C. de Briailles (Jap.) (Dobbie).—Height 2 feet 6 inches; good habit; free flowering; flowers semi-double, cream white, shaded with pink. In flower September 15.

11. Blanche Colomb (Ref.), × × × October 4, 1897 (Barr).—

Height 2 feet; bushy habit; free flowering; flowers sulphur yellow. In flower September 23.

12. Blanc Précocé (Ref.) (Dobbie).—Height 3 feet; bushy habit; flowers blush, petals tipped with pink. In flower October 15.

13. Blushing Bride (Pom.), $\times \times \times$ September 17, 1897 (Dobbie, Cannell, Divers).—Height 2 feet 6 inches; good habit; very free flowering; flowers lilac, shading to white. In flower August 28.

14. Bouquet Æstival (Jap.) (Barr).—Height 3 feet; bushy habit; free flowering; flowers flat, rosy purple. In flower October 10.

15. Bronze Blushing Bride (Pom.), $\times \times \times$ September 17, 1897 (Dobbie, Cannell, Barr).—Height 2 feet 9 inches; good habit; very free flowering; flowers rosy lilac, tipped with gold. In flower September 4.

16. Bronze Prince (Jap.), $\times \times \times$ October 4, 1897 (Jones).—Height 2 feet 6 inches; slender habit; very free flowering; flowers old gold colour. In flower September 23.

17. California (Ref.) (Barr).—Height 20 inches; bushy habit; free flowering; flowers large, clear yellow. In flower October 6.

18. Canari (Pom.), $\times \times \times$ September 17, 1897 (Dobbie, Barr).—Height 18 inches; very bushy, compact habit; very free flowering; flowers lemon yellow. In flower September 12.

19. Crimson Précocité (Pom.) (Dobbie, Barr, Divers).—Height 2 feet 6 inches; very bushy habit; free flowering; flowers crimson, tipped with gold. In flower October 20.

20. Chevalier Ange Bandiera (Jap.) (Cannell, Barr).—Height 3 feet; vigorous, sturdy habit; very free flowering; flowers large, pink, suffused with purple, silvery reverse. In flower September 17.

21. Claret Belle (Jap.) (Jones).—Height 3 feet 6 inches; straggling habit; moderately free flowering; flowers crimson, yellow reverse. In flower August 30.

22. Commandant Schneider (Barr).—Had not come into flower on October 25.

23. Coral Queen (Jap.) (Dobbie).—Height 4 feet; loose habit; moderately free flowering; flowers large, of a beautiful coral colour. In flower September 13.

24. Comtesse Foucher de Cariel (Ref.), A.M. October 22,

1897 (Barr, Dobbie).—Height 2 feet; bushy habit; very free flowering; flowers orange, yellow reverse. In flower October 10.

25. De la Bouère (Ref.) (Jones).—Height 3 feet 6 inches; moderately free flowering; flowers rich claret colour. In flower October 18.

26. Dodo (Pom.), $\times \times \times$ September 17, 1897 (Cannell).—Height 1 foot; very bushy, flat habit; very free flowering; flowers canary yellow. In flower September 3.

27. Dorcis (Jap.) (Dobbie).—Height 3 feet; flowers large, cream white, shaded with pink. In flower October 1.

28. Edie Wright (Jap.), $\times \times \times$ October 4, 1897 (Dobbie, Jones).—Height 3 feet; good habit; very free flowering; flowers large, rosy purple shading to pink. In flower September 24.

29. Early Blush (Pom.), $\times \times \times$ September 17, 1897 (Dobbie, Barr).—Height 15 inches; bushy, compact habit; very free flowering; flowers lilac pink, centre white. In flower August 18.

30. Edith Syrratt (Jap.), $\times \times \times$ September 17, 1897 (Dobbie, Cannell).—Height 2 feet 3 inches; free flowering; flowers purple. In flower July 20.

31. Edith Owen (Jap.) (Dobbie).—Height 3 feet; flowers soft pink, silvery reverse. In flower October 18.

32. Edwin Rowbottom (Jap.) (Divers).—Height 3 feet; good habit; free flowering; flowers large, canary yellow. In flower October 5.

33. Fiberta (Pom.), $\times \times \times$ October 4, 1897 (Divers, Barr, Cannell).—Height 2 feet; bushy, compact habit; very free flowering; flowers rich canary yellow. In flower August 20.

34. Flora (Pom.), $\times \times \times$ September 17, 1897 (Dobbie, Cannell, Divers, Barr).—Height 20 inches; bushy habit; very free flowering; flowers golden yellow. In flower July 20.

35. François Vuillermet (Jap.) (Jones).—Height 2 feet; bushy habit; flowers flat, rosy purple. In flower September 21.

36. Frederick Marronet (Pom.) (Cannell, Barr).—Height 18 inches; bushy habit; free flowering; flowers orange yellow. In flower September 1.

37. Fred Pele (Pom.) (Dobbie, Cannell, Barr).—Height 2 feet; straggling habit; moderately free flowering; flowers dull purplish crimson, tipped with gold. In flower September 3.

38. General Hawkes (Jap.), **A.M.** October 4, 1892 (Dobbie).—Height 3 feet 6 inches; very free flowering; flowers large, rich purple; silvery reverse. In flower October 1.

39. George Menier (Jap.) (Barr).—Height 3 feet; slender habit; flowers rich purple. In flower September 17.

40. G. Wermig (Jap.), **F.C.C.** October 14, 1884 (Dobbie, Divers, Cannell).—Height 3 feet; good habit; very free flowering; flowers deep yellow, outer petals soft yellow. In flower September 1.

41. Gloire d'Astaford (Jap.) (Dobbie).—Height 4 feet; loose straggling habit; free flowering; flowers orange scarlet. In flower October 6.

42. Gloire de Mezin (Jap.) (Dobbie, Barr).—Height 4 feet; straggling habit; free flowering; flowers very large, chestnut red. In flower October 16.

43. Golden Drop (Pom.) (Barr).—Height 18 inches; bushy habit; very free flowering; flowers rich canary yellow. In flower August 20.

44. Golden Fleece (Ref.), $\times \times \times$ September 17, 1897 (Dobbie, Cannell).—Height 2 feet; bushy habit; flowers golden yellow, running to a lighter shade with age. In flower July 19.

45. Grace Attick (Pom.) (Divers).—Height 18 inches; very free flowering; flowers canary yellow. In flower August 24.

46. Harvest Home (Jap.), $\times \times \times$ October 4, 1897 (Barr).—Height 2 feet 6 inches; good habit; free flowering; flowers large, bronze red tipped with gold, yellow reverse. In flower September 27.

47. Harvest Queen (Ref.) (Jones).—Height 2 feet 6 inches; bushy habit; flowers cream white. In flower October 10.

48. Illustration (Pom.) (Barr).—Height 15 inches; bushy habit; free flowering; flowers blush white. In flower August 23.

49. Ivy Elphic (Jap.) (Dobbie, Jones).—Height 2 feet; bushy habit; moderately free flowering; flowers large, white suffused with pink. In flower October 8.

50. Ivy Stark (Jap.), $\times \times \times$ October 4, 1897 (Jones).—Height 2 feet 6 inches; bushy habit; very free flowering; flowers large, pale orange yellow. In flower September 21.

51. Jacintha (Pom.) (Dobbie).—Height 20 inches; bushy habit; moderately free flowering; flowers rose lilac. In flower July 22.

52. Jeanne Vuillermet (Jap.) (Cannell).—Height 4 feet 6 inches; straggling habit; flowers semi-double, colour dull crimson. In flower October 8.

53. Lady Fitzwygram (Jap.), $\times \times \times$ October 4, 1897 (Dobbie, Cannell, Divers, Barr).—Height 20 inches; bushy, sturdy grower; very free flowering; flowers large, pure white. In flower September 27.

54. La Luxembourg (Pom.) (Dobbie).—Height 18 inches; bushy habit; free flowering; flowers orange yellow. In flower August 30.

55. L'Ami Condorcet (Pom.), **A.M.** September 17, 1897 (Dobbie, Cannell, Barr).—Height 15 inches; very bushy, compact habit; very free flowering; flowers soft yellow, deeper centre, very fine. In flower August 18.

56. La Perle (Jap.) (Dobbie).—Height 2 feet; moderately free flowering; flowers pearly white. In flower October 14.

56a. La Vierge (Ref.), $\times \times \times$ October 4, 1897 (Dobbie, Cannell, Divers).—Height 2 feet; bushy, sturdy habit; free flowering; flowers white, suffused with pink. In flower September 24.

57. Lemon Yellow (Jap.) (Cannell).—Height 3 feet; erect habit; flowers lemon yellow. In flower September 10.

58. Lemon Queen (Ref.) (Jones).—Height 2 feet 6 inches; bushy habit; very free flowering; flowers old gold colour. In flower October 12.

59. Le Poète des Chrysanthèmes (Ref.) (Dobbie, Cannell).—Height 3 feet 9 inches; loose straggling habit; free flowering; flowers rose, shaded with purple. In flower September 10.

60. Little Bob (Pom.), $\times \times \times$ September 17, 1897 (Dobbie, Barr).—Height 2 feet; bushy habit; very free flowering; flowers deep red, fading to brick red. In flower August 20. This variety was received under the name of Scarlet Gem.

61. Longfellow (Pom.), **A.M.** September 17, 1897 (Dobbie, Cannell, Barr).—Height 2 feet 9 inches; bushy habit; very free flowering; flowers blush white, exterior of petals pink. In flower July 19.

62. Lutea (Jap.) (Jones).—Height 3 feet 6 inches; loose straggling habit; moderately free flowering; flowers primrose yellow with a deeper centre. In flower October 16.

63. Lyon (Pom.) (Dobbie, Cannell).—Height 3 feet; vigorous

grower; moderately free flowering; flowers rosy purple. In flower September 18.

64. Madame A. Colmiche (Pom.) (Dobbie).—Height 3 feet 6 inches; loose straggling habit; moderately free flowering; flowers reddish orange with fimbriated petals. In flower October 14.

65. Madame A. Nonin (Jap.) (Jones).—Height 3 feet; bushy habit; moderately free flowering; flowers pink, striped with white; petals beautifully fimbriated. In flower October 18.

66. Madame C. Desgranges (Jap.), $\times \times \times$ September 17 1897 (Dobbie, Cannell, Barr).—Height 2 feet 6 inches; bushy habit; very free flowering; flowers large, of good shape, cream white, lighter guard petals. In flower August 16.

67. Madame E. Lefort (Pom.), **A.M.** October 6, 1891 (Cannell, Divers, Barr).—Height 2 feet; good habit; free flowering; flowers fimbriated, old gold, shaded with red. In flower September 15.

68. Madame Gabus (Pom.) (Dobbie, Cannell).—Height 2 feet 6 inches; bushy habit; moderately free flowering; flowers rosy lilac and white. In flower September 3.

69. Madame Gajac (Jap.), $\times \times \times$ October 22, 1897 (Jones).—Height 2 feet; bushy habit; free flowering; flowers mauve, silvery reverse. In flower October 2.

70. Madame Gastellier (Jap.), $\times \times \times$ September 17, 1897 (Cannell, Divers).—Height 2 feet; bushy habit; free flowering; flowers creamy white. In flower August 21.

71. Madame H. Jacotot (Jap.), **F.C.C.** November 13, 1883 (Dobbie, Jones).—Height 3 feet; shy bloomer; flowers large, purplish pink, suffused with white. In flower October 20.

72. Madame Jolivart (Pom.), $\times \times \times$ September 17, 1897 (Dobbie, Cannell, Barr).—Height 18 inches; very bushy habit; very free flowering; flowers white, shaded with pink. In flower September 3.

73. Madame L. Collier (Jap.) (Dobbie).—Height 2 feet 6 inches; loose habit; free flowering; flowers orange yellow. In flower October 6.

74. Madame Eulalie Morel (Jap.), $\times \times \times$ September 17, 1897 (Cannell, Barr).—Height 2 feet 6 inches; very free flowering; flowers cerise, shaded with gold. In flower August 28.

75. Madame Léon Lassala (Ref.) (Dobbie).—Height 2 feet;

bushy habit ; free flowering ; flowers creamy white. In flower September 14.

76. Madame Louis Lionnet (Jap.), $\times \times \times$ September 17, 1897 (Divers, Barr).—Height 2 feet 6 inches ; bushy habit ; very free flowering ; flowers salmon pink. In flower September 10.

77. Madame Max Duffose (Jap.) (Jones, Barr).—Height 3 feet 6 inches ; loose habit ; flowers very large, crimson, golden reverse. In flower October 15.

78. Madame Marie Masse (Jap.), $\times \times \times$ September 17, 1897 (Dobbie, Cannell, Divers, Barr).—Height 2 feet ; bushy habit ; free flowering ; flowers large, lilac mauve. In flower August 27.

79. Madame Picoul (Pom.) (Cannell, Barr).—Height 18 inches ; bushy habit ; very free flowering ; flowers rosy lilac. In flower August 13.

80. Madame Zephir Lionnet (Ref.) (Dobbie, Cannell, Barr).—Height 3 feet 3 inches ; spreading habit ; very free flowering ; flowers orange red, tipped with gold. In flower September 18.

81. Madlle. Françoise van Leveau (Jap.) (Cannell).—Height 4 feet ; straggling habit ; flowers rich purple. In flower October 8.

82. Madlle. Guindudeau (Jap.), $\times \times \times$ October 4, 1897 (Jones).—Height 2 feet 6 inches ; bushy, spreading habit ; flowers large, pink, suffused with purple. In flower September 21.

83. Madlle. Sabatier (Jap.), $\times \times \times$ October 22, 1897 (Jones).—Height 4 feet ; straggling habit ; flowers purplish crimson. In flower October 15.

84. Maria (Jap.) (Dobbie).—Height 3 feet 9 inches ; loose habit ; very free flowering ; flowers flat, purple. In flower September 14.

85. Martinmas (Ref.), $\times \times \times$ October 4, 1897 (Divers, Dobbie, Barr).—Height 3 feet ; good habit ; free flowering ; flowers pink, silvery reverse. In flower September 24.

86. Massi Faire (Jap.) (Jones).—Height 3 feet ; bushy habit ; flowers flat, deep rose pink. In flower October 21.

87. Maud Pitcher (Pom.), **A.M.** August 27, 1889 (Barr).—Height 20 inches ; moderately free flowering ; flowers bronze yellow. In flower August 30.

88. Miss Davis (Pom.), $\times \times \times$ September 17, 1897 (Dobbie).—

Height 3 feet 6 inches; vigorous grower; flowers soft pink, tipped with blush white. In flower September 15.

89. Mrs. Burrell (Jap.); **F.C.C.** August 10, 1886 (Cannell, Dobbie).—Height 2 feet 6 inches; vigorous grower; very free flowering; flowers large, soft yellow, deeper centre. In flower September 1.

90. Mrs. A. J. Parker (Jap.) (Barr).—Height 4 feet; loose straggling habit; flowers large, pink, suffused with salmon. In flower October 21.

91. Mrs. Cullingford (Pom.), $\times \times \times$ September 17, 1897 (Dobbie, Cannell).—Height 3 feet 6 inches; sturdy habit; very free flowering; flowers blush white. In flower September 8.

92. Mrs. Gifford (Jap.) (Dobbie).—Height 4 feet 6 inches; loose habit; flowers, pink. In flower October 8.

93. Mrs. Hawkins (Jap.), **F.C.C.** September 11, 1888 (Dobbie, Divers, Barr).—Height 2 feet 6 inches; bushy habit; very free flowering; flowers large, rich golden yellow. In flower August 30.

94. Mrs. J. R. Pitcher (Jap.) (Divers, Barr).—Height 2 feet 9 inches; loose habit; free flowering; flowers blush white, shaded with pink. In flower September 3.

95. Mr. Selly (Pom.), $\times \times \times$ September 17, 1897 (Dobbie, Barr).—Height 18 inches; very bushy, compact habit; very free flowering; flowers rosy pink. In flower August 30.

96. Mr. W. Piercy (Pom.) (Barr).—Height 15 inches; compact habit; free flowering; flowers orange red. In flower August 13.

97. Mignon (Pom.) (Divers).—Height 15 inches; bushy habit; very free flowering; flowers rich yellow. In flower August 21.

98. Mignonne (Jap.) (Jones).—Height 4 feet; straggling habit; very free flowering; flowers large, light purple. In flower October 10.

99. Mons. A. Dafour (Jap.) (Dobbie).—Height 3 feet; straggling habit; moderately free flowering; flowers large, rose, suffused with pink. In flower October 1.

100. Mons. A. Herlaut (Pom.) (Dobbie, Cannell).—Height 20 inches; spreading habit; very free flowering; flowers fimbriated, red, shaded with purple and tipped with gold. In flower October 2.

101. Mons. Dupuis (Ref.) (Cannell, Jones, Barr).—Height 2 feet 9 inches; loose habit; moderately free flowering; flowers bronzy yellow. In flower August 17.

102. Mons. Foukabra (Jap.) (Dobbie).—Height 3 feet; flowers semi-double, orange red, yellow reverse. In flower October 8.

103. Mons. Frederick Sysmayer (Jap.) (Cannell).—Height 4 feet; loose habit; flowers orange and gold. In flower October 6.

104. Mons. G. Dubor (Jap.) (Cannell, Dobbie).—Height 4 feet; straggling habit; moderately free flowering; flowers orange yellow, striped and suffused with red. In flower October 6.

105. Mons. Gustave Grunnerwald (Jap.) (Cannell, Barr).—Height 2 feet; good habit; very free flowering; flowers silvery pink, shaded with rose. In flower August 11.

106. Montague (Jap.) (Dobbie, Cannell).—Height 4 feet; straggling habit; flowers purple crimson, silvery reverse. In flower September 23.

107. M. Blackmann (Jap.) (Jones).—Height 4 feet 6 inches; vigorous upright habit; flowers chestnut red. In flower October 8.

108. M. Chanchard (Jap.) (Jones).—Height 3 feet; loose habit; moderately free flowering; flowers orange scarlet, yellow reverse. In flower October 10.

109. M. E. Pynaert van Geert (Jap.) (Cannell).—Height 3 feet; loose habit; flowers reddish orange. In flower October 6.

110. M. F. L. Usmayer (Jap.) (Barr).—Height 4 feet; loose straggling habit; flowers large, orange red, tipped with gold. In flower October 19.

111. M. J. Bte. Cauvin (Jap.) (Jones).—Height 3 feet 6 inches; straggling habit; flowers crimson, old gold reverse. In flower October 1.

112. Mychett White (Jap.), **A.M.** September 17, 1897 (Jones).—Height 18 inches; bushy habit; very free flowering; flowers large, pure white. In flower September 6.

113. Nanum (Pom.), $\times \times \times$ September 17, 1897 (Dobbie).—Height 20 inches; very bushy compact habit; very free flowering; flowers blush white. In flower September 3.

114. Notaire Groz (Jap.) (Dobbie).—Height 4 feet; straggling habit; flowers pink. In flower October 5.

115. October Queen (Jap.) (Barr).—Height 2 feet 6 inches; loose habit; moderately free flowering; flowers pale salmon suffused with terra cotta. In flower October 19.

116. October Yellow (Jap.) (Barr).—Height 2 feet 6 inches; bushy spreading habit; flowers deep canary yellow. In flower October 8.

117. O. J. Quintas (Jap.) (Dobbie).—Similar to No. 99.

118. Orange Child (Jap.), $\times \times \times$ October 4, 1897 (Dobbie, Cannell).—Height 3 feet 6 inches; bushy habit; free flowering; flowers large, deep yellow. In flower September 17.

119. Petilland (Pom.), $\times \times \times$ September 17, 1897 (Cannell, Barr).—Height 2 feet; bushy compact habit; very free flowering; flowers cream white, yellow centre. In flower September 10.

120. Piercy's Seedling (Pom.), $\times \times \times$ September 17, 1897 (Divers, Barr, Cannell, Dobbie).—Height 18 inches; very bushy habit; very free flowering; flowers bronze yellow, shading to orange. In flower August 27.

121. Précocité (Pom.) (Dobbie).—Height 2 feet; bushy habit; very free flowering; flowers rich yellow. In flower August 30.

122. Précocité Japonaise (Pom.) (Dobbie, Divers).—Height 2 feet; spreading habit; free flowering; flowers lilac rose and white. In flower September 20.

123. Rose Wells (Ref.), **A.M.** September 24, 1894 (Cannell, Wells).—Height 15 inches; bushy habit; very free flowering; flowers rose pink. In flower September 7.

124. Ruby King (Jap.) (Jones, Barr).—Height 2 feet; bushy sturdy habit; very free flowering; flowers rich crimson. In flower October 4. This variety was also sent under the name of Crimson Queen.

125. Ryecroft Glory (Jap.), **A.M.** October 24, 1893 (Divers, Barr, Dobbie).—Height 3 feet; bushy habit; very free flowering; flowers large, orange yellow. In flower October 8.

126. St. Croats (Pom.) (Dobbie).—Height 2 feet; bushy habit; free flowering; flowers light pink. In flower September 3.

127. St. Mary (Pom.) (Dobbie, Barr).—Height 20 inches;

bushy habit; free flowering; flowers white, shaded with pink. In flower August 30.

128. Samuel Barlow (Jap.) (Divers, Barr).—Height 3 feet 6 inches; free flowering; flowers large, rosy buff, tipped with golden yellow. In flower August 27.

129. Silversmith (Ref.) (Dobbie).—Similar to No. 75.

130. Souvenir de A. P. Bouwman (Jap.) (Jones).—Height 4 feet 6 inches; loose straggling habit; moderately free flowering; flowers rosy purple, silvery reverse. In flower October 19.

131. Souvenir de M. Menier. (Dobbie).—Had not come into flower on October 25.

132. Strathmeath (Ref.), $\times \times \times$ September 17, 1897 (Dobbie, Cannell).—Height 2 feet; good bushy habit; very free flowering; flowers rose pink. In flower August 30.

133. Sunshine (Jap.), **A.M.** August 13, 1895 (Dobbie).—Height 4 feet; straggling habit; moderately free flowering; flowers rich yellow. In flower October 2.

134. The Don (Jap.) (Barr).—Height 2 feet 3 inches; flowers rich purple. In flower September 27.

135. Toreador (Pom.), $\times \times \times$ September 17, 1897 (Dobbie, Cannell).—Height 2 feet 3 inches; bushy habit; very free flowering; flowers red, tipped with orange. In flower August 28.

136. Vice-President Hardy (Jap.) (Dobbie, Cannell, Barr).—Height 4 feet; loose habit; free flowering; flowers orange scarlet, yellow reverse. In flower October 1.

137. Vicomtesse d'Avène (Jap.) (Dobbie).—Height 2 feet; loose habit; very free flowering; flowers flat, purple, tipped with rose. In flower September 2.

138. White Lady (Pom.) (Dobbie).—Height 2 feet; bushy habit; free flowering; flowers blush white, shading to pink.

139. White St. Croats (Pom.), $\times \times \times$ September 17, 1897 (Dobbie).—Height 2 feet; bushy spreading habit; very free flowering; flowers white. In flower September 3.

140. Yellow Gem (Pom.), **A.M.** October 15, 1895 (Cannell).—Height 2 feet 6 inches; moderately free flowering; flowers fimbriated, orange yellow. In flower September 24.

ANNUAL FLOWERS GROWN AT CHISWICK, 1897.

A COLLECTION of 379 stocks of Annuals was sown in rich and deeply worked soil on May 7, but the seed germinated somewhat irregularly. When the young plants were large enough, they were thinned out to proper distances in order to show the distinctive character of each. The season was by no means favourable to the proper development of Annuals, as it was so excessively hot and dry, but in spite of the heat and drought the plants made fairly good growth and flowered well. The Floral Committee examined the various stocks on four occasions.

A.M. = Award of Merit.

× × × = Highly Commended.

× × = Commended.

ASTERS.

1. Dwarf Chrysanthemum-flowered (Dobbie, Heinemann).—Plants of bushy compact habit; very free flowering; flowers large, perfectly double and of excellent shape. Height 9 inches to 1 foot. Useful for marginal lines. Shining brick rose and white, × × × September 8, 1897 (Heinemann).

2. Victoria (Dobbie, Heinemann).—A very popular and useful section. Plants of bushy habit; very free flowering; flowers large, massive, supported on stout stems. Height 15 inches to 18 inches. The strain was commended September 6, 1888.

3. Dwarf Victoria (Dobbie).—Similar to the last, but dwarfer and more compact. Height 9 inches to 1 foot. Bright rose, tipped with white, × × × September 8, 1897. Plant of erect habit. Height 10 inches.

4. Washington (Dobbie, Yates).—A very useful free-flowering section. Flowers large, of good form, and variously coloured. Height 15 inches.

5. Mignon (Dobbie).—Much the same as the Victoria, but dwarfer, and the flowers borne with greater freedom. Height 1 foot to 15 inches. White, × × × September 8, 1897.

6. Dwarf Queen (Heinemann).—Plants of compact habit; flowers very large and full. Height 9 inches to 1 foot. The strain was Highly Commended August 24, 1888.

7. Giant Comet (Dobbie, Vilmorin).—A magnificent strain

with large variously coloured flowers, the petals long, broad, drooping. Height 18 inches. The Bride, $\times \times \times$ September 8, 1897 (Dobbie). Flowers large, delicate pink, shading to white.

8. Dwarf Comet (Dobbie).—A dwarf selection of the last, but of more pyramidal habit. Height 9 inches to 1 foot.

9. Lilliput (Dobbie).—Plants of erect branching habit; very free flowering; flowers small, of rich and varied colours, the centre petals beautifully quilled. Height 16 inches to 20 inches. The strain was Highly Commended September 5, 1889. Lilliput Rose, $\times \times \times$ September 8, 1897. A charming variety. Lilliput White, rose centre, $\times \times \times$ September 17, 1897.

10. Pæony-flowered Perfection (Heinemann, Yates).—A very useful group. Plants of branching, spreading habit; very free flowering; flowers large, double, and beautifully incurved. Height 1 foot to 20 inches. The strain was Commended September 6, 1888.

11. Pæony-flowered Globe or Uhland (Dobbie).—A very handsome free-flowering group. The incurved flowers are large and very showy. Height 9 inches to 1 foot. The strain was Highly Commended September 6, 1888.

12. Pæony-flowered or Incurved (Dobbie).—A magnificent strain. Plants of bushy habit; very free flowering; flowers very large; colours rich and varied. Height 20 inches to 2 feet.

13. Dwarf Pæony-flowered (Dobbie).—Plants of branching habit; free flowering; flowers large, richly coloured. Height 6 inches to 9 inches.

14. Quilled (Dobbie).—A very useful and showy group. Flowers large, globular, drooping, guard petals flat and broad, the centres well quilled. Height 18 inches to 2 feet.

15. Double Dwarf (Dobbie).—Plants of bushy habit; free flowering. Height 16 inches.

16. Dwarf Bouquet-flowered (Dobbie).—Plants of compact habit; flowers small, very showy. Height 6 inches to 9 inches. The strain was Highly Commended September 5, 1889.

17. Dwarf Pyramidal Bouquet (Dobbie).—A very beautiful group. Plants of good habit; very free flowering. Height 9 inches to 1 foot. The strain was Highly Commended September 5, 1889.

18. Dwarf Cocardeau or Crown (Dobbie).—A distinct group of moderate growth. Flowers large, with white centres. Height

9 inches. The strain was Highly Commended September 6, 1888.

19. Tall Cocardeau or Crown (Dobbie).—Similar to the last, but taller. Height 15 inches to 22 inches.

20. Ball or Jewel (Dobbie, Heinemann).—The distinct ball-shaped flowers are of medium size and perfect shape. Very useful. Height 1 foot to 15 inches. Ball or Jewel Scarlet, $\times \times \times$ September 5, 1889. Very free flowering.

21. Imbricated Pompon (Dobbie).—Plants of erect pyramidal habit; flowers small, borne very freely on long stems. Height 16 inches to 20 inches. Rose, $\times \times \times$ September 8, 1897.

22. Imbricated or Pompon Crown (Dobbie).—Flowers small white centres. Height 15 inches to 20 inches. Rose, $\times \times \times$ September 8, 1897. Flowers borne on long stems.

23. Queen of the Earlies (Dobbie, Vilmorin).—Plants of free spreading habit; flowers large, flat, richly coloured. Height 10 inches to 15 inches. Very early blooming.

24. Shakespeare (Dobbie).—Plants of compact habit; flowers small, quilled. Height 4 inches to 6 inches.

25. Lady in White (Dobbie).—A very distinct and handsome free-flowering variety, with large, pure white flowers. Height 1 foot. Highly Commended September 19, 1895.

26. Japanese mixed (Vilmorin).—A somewhat poor selection. Height 15 inches.

CANDYTUFT.

27. Carmine (Watkins & Simpson).—Plants of straggling habit; leaves light green, lanceolate; very free flowering; flowers large, rich carmine.

28. Carter's Spiral (Carter).—Height 1 foot; very free flowering; flowers large white. A fine variety.

29. Crimson Purple (Carter).—Height 10 inches; lax habit; flowers of medium size, colour purple.

30. Dwarf Hybrids (Watkins & Simpson).—Height 6 inches to 1 foot; flowers large, of rich and varied colours.

31. Old Variety (Carter).—Plants of loose growth; free flowering; flowers mauve, running to a lighter shade with age.

32. Tom Thumb (Watkins & Simpson).—Height 6 inches; very free flowering; flowers small, white, yellow centre.

32A. White (Carter).—Height 10 inches ; good habit ; free flowering ; flowers white.

33. White Spiral (Carter).—Similar to No. 28.

34. White Rocket Empress (Watkins & Simpson).—Height 1 foot, of even regular growth ; very free flowering ; flowers large, white, yellow centre. Very fine.

CALLIOPSIS.

35. Nigra nana, $\times \times \times$ August 19, 1897 (Watkins & Simpson).—Plant of bushy compact habit ; exceptionally free flowering ; flowers deep velvety crimson. Very effective for marginal lines. A continuous bloomer.

CENTAUREA.

36. Marguerita (Yates, Veitch).—Height 2 feet ; loose straggling habit ; white flowers borne on long stems.

37. Marguerita, Blue (Veitch).—Height 20 inches ; flowers pinkish blue.

CHRYSANTHEMUM CORONARIUM.

38. Double Lemon (Watkins & Simpson).—Height 18 inches ; flowers small, semi-double, lemon yellow.

39. Double Sulphur (Watkins & Simpson).—Height 2 feet 6 inches ; flowers sulphur yellow.

40. Double White (Watkins & Simpson).—Height 18 inches ; flowers small, semi-double, cream white, yellow centre.

41. Double Yellow (Watkins & Simpson).—Height 2 feet ; flowers small, semi-double, deep golden yellow.

CLARKIA.

42. Elegans (Veitch).—Height 2 feet ; moderately free flowering ; flowers lilac-rose.

43. Elegans rosea fl. pl. (Veitch).—Height 2 feet ; free flowering ; flowers semi-double, soft salmon rose.

44. Integripetala (Veitch, Carter).—Height 18 inches ; sturdy habit ; free flowering ; flowers rosy purple.

45. Integripetala alba (Veitch).—Height 14 inches ; bushy habit ; flowers white.

46. Mrs. Langtry (Carter).—Height 9 inches ; free flowering ; flowers rosy purple, margined with blush white.

47. *Pulchella* (Carter).—Height 1 foot; good habit; free flowering; flowers lilac purple.

48. *Pulchella alba* (Veitch).—Height 1 foot; flowers small, white.

49. *Pulchella alba* fl. pl. (Veitch).—Height 14 inches; flowers blush white.

50. *Pulchella*, Double Crimson (Watkins & Simpson).—Height 18 inches. Stock mixed.

51. *Pulchella*, Double Purple (Watkins & Simpson).—Height 10 inches; flowers bright purple. Very distinct.

52. *Pulchella* fl. pl. (Veitch).—Height 12 inches; moderately free flowering; flowers semi-double, deep rose shaded with violet.

53. *Pulchella marginata* fl. pl. (Veitch).—Height 1 foot; flowers rose, deeply margined with white.

54. *Pulchella*, Tom Thumb, double white (Watkins & Simpson).—Height 8 inches; compact habit; very free flowering; flowers double, blush white.

DIANTHUS CHINENSIS.

55. *Heddewegii* (Veitch).—Height 1 foot; compact habit; flowers large and handsome.

56. *Heddewegii* fl. pl., Salmon Queen (Veitch).—Height 8 inches. Stock mixed.

57. *Heddewegii*, Crimson Belle (Watkins & Simpson).—Height 1 foot; bushy, compact habit; very free flowering; flowers large, and of much substance; crimson, maroon centre. Very fine.

58. *Heddewegii* *Diadematis* fl. pl. (Veitch).—Height 6 inches to 8 inches; compact habit; free flowering; flowers double.

59. *Heddewegii*, The Bride (Veitch).—Height 1 foot; bushy compact habit; very free flowering; flowers large, white, purple centre.

60. *Laciniatus* (Veitch).—Height 1 foot; flowers large and handsome.

61. *Laciniatus flore pleno* (Veitch).—Height 1 foot; free flowering; flowers of medium size.

ESCHSCHOLTZIA.

62. Mandarin, $\times \times \times$ July 18, 1889 (Watkins & Simpson).—Height 1 foot; foliage beautifully cut and of a soft glaucous hue; flowers canary yellow, centre deeper yellow. Very effective.

63. Maritima (Carter).—Height 10 inches; bushy habit; foliage blue grey; flowers yellow, centre deep orange.

GODETIAS.

64. Bridesmaid (Veitch).—Height 2 feet; sturdy habit; very free flowering; flowers blush and rose, lighter centre, the centre of each petal striped with white.

65. Butterfly (Veitch).—Height 1 foot; compact habit; free flowering; flowers large, rosy purple, white centre.

66. Duchess of Albany (Veitch).—Height 1 foot; lax habit; flowers large, borne in clusters, white, shaded with pink.

67. Duchess of Albany compacta (Watkins & Simpson).—A dwarf free-flowering form of No. 66.

68. Lady Albemarle (Veitch).—Height 1 foot; compact habit; exceptionally free flowering; flowers rose, shaded with purple.

69. Lady, Satin Rose (Carter).—Height 9 inches; bushy habit; free flowering; flowers bright rose, lighter centre.

70. Lady, Satin Rose, Improved (Watkins & Simpson).—Height 6 inches; bushy habit; free flowering; flowers rich rose, white centre. Very fine.

71. La Belle (Veitch).—Similar to No. 65.

72. Rosea alba (Carter, Veitch).—Height 16 inches; good habit; flowers blush white, deep rose centre.

73. Princess of Wales (Carter).—Height 10 inches; rather loose habit; moderately free flowering; flowers bright rose, changing to light purple.

74. The Bride (Veitch).—Height 16 inches; slender habit; flowers small, blush white, rose centre.

75. Whitneyi (Veitch).—Height 1 foot; good habit; free flowering; flowers blush, varying to red.

HAWKWEED.

76. Red (Veitch).—Height 16 inches; compact, bushy habit; flowers borne on long stems, colour pink.

77. White (Veitch).—Height 1 foot; compact habit; free flowering; flowers bluish white.

78. Yellow, $\times \times \times$ July 18, 1889 (Veitch).—Height 18 inches; straggling habit; flowers soft yellow. Very effective. A continuous bloomer.

LEPTOSIPHON.

79. Aureus (Veitch).—Height 4 inches; very compact habit; flowers small, yellow, deeper centre.

80. Densiflorus (Veitch).—Height 18 inches; very free flowering; flowers borne in clusters; colour mauve.

81. Hybridus (Veitch).—Height 6 inches. A very good strain. Flowers yellow, white, rose, pink, scarlet, &c.

82. Densiflorus albus (Veitch).—Height 10 inches; flowers white.

83. Roseus, $\times \times \times$ July 18, 1889 (Veitch).—Height 6 inches; flowers small; colour rosy pink.

The Leptosiphons are admirably adapted for planting on rockeries or dry banks.

LOVE-LIES-BLEEDING.

84. Love-lies-bleeding (Watkins & Simpson).—Height 3 feet 9 inches; vigorous grower, carrying long drooping racemes of deep crimson flowers.

MATRICARIA.

85. Golden Ball, **A.M.** September 17, 1897 (Carter).—Height, 1 foot; bushy, compact, pyramidal habit; flowers small, borne very freely at the points of the growths; colour golden yellow. A profuse and continuous bloomer.

MARIGOLDS.

86. African Lemon, $\times \times$ September 8, 1897 (Watkins & Simpson).—Height 2 feet; free flowering; flowers double, of medium size, canary yellow. A very good strain.

87. African Orange, $\times \times$ September 8, 1897 (Watkins & Simpson).—Height 2 feet; very free flowering; flowers double, rich canary yellow.

88. Dwarf African Lemon (Veitch).—A dwarf form of No. 86.

89. Dwarf African Orange (Veitch).—A very good dwarf form of No. 87, but a week later in coming into flower.

90. Pigmy Golden (Watkins & Simpson).—Height 6 inches; spreading habit; very free flowering; flowers of good form, double, rich orange.

91. Pigmy Spotted (Watkins & Simpson).—Height 6 inches; bushy spreading habit; free flowering; flowers yellow, spotted with crimson.

92. Tall French, Scotch Prize (Watkins & Simpson).—Height 2 feet; free flowering; flowers large, full, yellow, striped and blotched with crimson.

93. Yates' Blotched and Tipped (Yates).—Height 18 inches; bushy habit; free flowering; flowers yellow, blotched and tipped with red.

See also Tagetes, 130, 131.

MIGNONETTE.

94. Crimson Victoria (Carter).—Plants of robust, free branching habit; very free flowering; flowers brownish crimson.

95. Golden Gem (Carter).—Plants of vigorous, sturdy, pyramidal habit; flowers golden yellow, very fragrant.

96. Golden Machet (Yates).—Plants of compact, bushy habit, with massive spikes of deep golden yellow flowers. A very fine variety.

97. Giant Machet, Salmon Red (Watkins & Simpson).—Plants of vigorous habit, with broad deep green leaves and stout compact spikes of salmon red flowers.

98. Giant Machet (Watkins & Simpson).—Plants of dwarf habit; the buff-coloured flowers are borne on stout spikes.

99. Perfection (Carter).—Plants of good habit; flowers red, borne on small spikes.

NASTURTIUMS.

100. Empress of India (Veitch).—Height 10 inches; very bushy habit; very free flowering; flowers large crimson, upper petals striped with maroon. A continuous bloomer.

101. King of Tom Thumb (Veitch).—Height 9 inches; compact, bushy habit; flowers thrown well above the foliage; colour rich scarlet. Very fine.

102. King of Tom Thumb, Scarlet (Carter).—Height 6 inches to 9 inches; bushy compact habit; flowers large, scarlet, upper petals streaked with crimson.

103. Tom Thumb Cloth of Gold (Veitch).—Height 1 foot ; bushy, compact habit ; foliage pale green ; moderately free flowering ; flowers large, bright orange.

104. Tom Thumb Crimson (Veitch).—Height 10 inches ; moderately free bloomer ; flowers rich crimson.

105. Tom Thumb Pearl (Veitch).—Stock not fixed.

106. Tom Thumb King Theodore (Veitch).—Height 9 inches ; very bushy habit ; free flowering ; flowers rich crimson, striped with maroon. Very fine.

107. Tom Thumb Ruby King (Veitch).—Height 10 inches ; bushy habit ; flowers borne well above the foliage ; colour ruby red.

108. Tom Thumb Yellow (Veitch).—Height 1 foot ; bushy habit ; exceptionally free flowering ; flowers borne well above the foliage ; colour deep yellow.

PAPAVERS (Poppies).

109. Cardinal fl. pl. (Veitch and Watkins & Simpson).—Height 18 inches ; foliage dark green, and deeply cut ; flowers large, double, bright scarlet. A continuous bloomer.

110. Danebrog, $\times \times \times$ July 18, 1889 (Veitch).—Height 18 inches to 2 feet ; flowers large, bright scarlet, blotched with silvery white.

111. Glaucum (Carter).—Height 1 foot to 15 inches ; foliage bluish green ; free flowering ; flowers clear crimson. Very showy.

112. Umbrosum, $\times \times \times$ July 18, 1889 (Carter).—Height 1 foot ; flowers large, crimson rose, spotted with dark brown.

113. Carnation-flowered (Veitch).—Height $2\frac{1}{2}$ feet to 3 feet ; flowers fringed, colours various. A fine strain.

114. Dwarf French Mixed (Veitch).—Height 14 inches ; flowers large, comprising many shades of pink, scarlet, and crimson.

115. Pæony-flowered Mixed (Veitch).—Height $2\frac{1}{2}$ feet ; flowers double, colours various. A good selection.

116. Shirley Hybrids, Extra Selected (Veitch).—Height $1\frac{1}{2}$ feet. A capital selection of a very fine strain. Flowers large, colours varying from white, through many shades of pink and scarlet, to deep crimson.

117. The Bride (Veitch).—Height 2 feet 6 inches; flowers large, pure white. A grand variety.

118. The Mikado (Veitch).—Height 2 feet; flowers fringed, snow white edged with crimson.

119. The New Picotee (Carter).—Height 1½ feet; sturdy habit; very free flowering; flowers single and semi-double; colours rich and varied.

120. White Swan (Veitch).—Height 18 inches; foliage glaucous green, deeply cut; flowers double white.

121. Yates' Avalanche (Yates).—Height 2 feet; flowers fringed, large white. Selected from Snowdrop.

SALPIGLOSSIS.

122. Salpiglossis (Veitch).—Height 1 foot to 18 inches. The large richly coloured flowers are borne with great freedom. A magnificent strain. Colours various.

SCHIZANTHUS.

123. Papilionaceus pyramidalis (Veitch).—Height 1 foot; bushy habit; very free flowering; flowers lilac blue, central portion yellow, spotted and striped with dark brown.

124. Pinnatus (Veitch).—Height 2 feet; flowers mauve and white.

125. Pyramidalis oculatus (Veitch).—Height 1 foot; very free flowering; flowers large, purple, lip white, blotched with dark brown.

126. Retusus (Veitch).—Height 1 foot; bushy habit; rather shy bloomer; flowers rose pink; upper petal orange yellow streaked with brown and tipped with deep rose.

127. Retusus albus (Veitch).—Height 15 inches; flowers white, upper petal orange yellow.

128. Retusus Grahmi (Veitch).—A vigorous, free-flowering form of No. 126.

129. Sweet Sultan, new deep purple (Yates).—Height 2 feet; vigorous grower; very profuse bloomer; flowers rich purple.

TAGETES.

130. Légion d'Honneur, × × × September 19, 1895 (Carter).—Height 6 inches; bushy habit; exceptionally free flowering;

flowers deep canary yellow, lower portion of petals deep crimson maroon. A continuous bloomer.

131. *Signata pumila* (Watkins & Simpson).—Height 7 inches; very bushy spreading habit; flowers golden yellow, blotched with orange.

TROPEOLUM.

132. *Lobbianum fulgens* (Watkins & Simpson).—Very vigorous sturdy grower; branching habit; moderately free flowering; flowers thrown well above the foliage, of medium size, colour crimson.

133. Seedling, unnamed (Goody).—Trailing habit; foliage pale green; flowers buttercup yellow, with serrated petals.

VISCARIA.

134. *Cardinalis fulgens* (Watkins & Simpson).—Height 1 foot; bushy compact habit; very free flowering; flowers rich crimson.

EXAMINATION IN HORTICULTURE.

1. The Council of the Royal Horticultural Society, sympathising with the efforts of various County Councils, technical institutes, schools, gardeners' mutual improvement societies, and other bodies to promote instruction in practical horticulture by means of lectures, demonstrations, &c., and in the hope of rendering such teaching more definite and effective, have consented to hold an examination in horticulture on Tuesday, April 5, 1898.

2. The following is an outline syllabus, showing the nature of the subjects to which it is considered desirable that the attention of students should be drawn.

ELEMENTARY PRINCIPLES.

On which Horticultural practice is based.

- (1) Soils, good and bad: their Nature and Composition: Weeds and their eradication.
- (2) Requirements of Growth—Water, Heat, Air.
- (3) Seeds: Nature of, Duration of Vitality in, and Modes of Germination.
- (4) Roots: Nature and functions of; Fibrils and Root-Hairs; what they do, and how they do it—what Helps and what Hinders them.
- (5) Stems and Branches: their Nature, Work, and uses; Helps and Hindrances to their work.

- (6) Leaves: what they are, what they do; Helps and Hindrances to their work.
- (7) Tubers and Bulbs, Leaf-Buds and Flower Buds.
- (8) Growth and development: increase in size and changes of Composition and Structure; Formation and Storage of Food Materials.
- (9) Flowers: their Component Parts; what they do; Artificial Fertilisation.
- (10) Fruit: Changes and Development during ripening; Forms and Varieties, as, *e.g.*, Apple, Strawberry, Plum, &c.
- (11) Seed: Formation of.
- (12) Variation and Selection.
- (13) Names and Orders of common Garden-Plants, Trees, &c.

HORTICULTURAL OPERATIONS AND PRACTICE.

- (1) Surveying and Landscape Gardening: Elements of.
- (2) Choice of Site for Garden.
- (3) Description and use of implements under each head.
- (4) Operations connected with the Cultivation of the Land, with explanations and illustrations of good and bad methods: Digging and Trenching; Draining; Hoeing, Stirring the Soil, and Weeding; Watering; Preparation of Seed Beds; Rolling and Raking, Sowing, Transplanting and thinning; Potting, Planting; Aspects, Positions and Shelter; Staking; Earthing and Blanching, &c.
- (5) Propagation. Elementary principles: Cuttings, Budding and Grafting, Stocks used, Layering, Division, Branch Pruning, Root Pruning; Old and Young Trees and Bushes. Training.
- (6) Fruit Culture: Open Air and Under Glass; Small Fruits; Apples and Pears; Stone Fruits; Gathering and Storing; Packing and Marketing. General Knowledge of Fruits, and Selection of Varieties.
- (7) Vegetable Culture: Tubers and Roots; Green Vegetables: Fruits and Seeds; Rotation of Crops, and Selection of Varieties.
- (8) Flower Culture, Outside and Under Glass.
- (9) Manures and their Application.
- (10) Improvement of Plants by Cross-breeding, Hybridisation and Selection.
- (11) Arboriculture: Trees and Shrubs and their Culture.
- (12) Insect and Fungus Pests: Prevention and Treatment.

3. Students and young gardeners not having had the advantage of attending lectures, but wishing to present themselves at some one of the centres for examination, might with advantage consult some of the following works: "Primer of Botany" (Macmillan & Co.), by Sir J. D. Hooker, K.C.S.I.; "Botany for Beginners" and "Plant Life" (Bradbury, Agnew & Co.), by M. T. Masters, M.D., F.R.S.; "Popular Gardening," 4 vols. (Cassell & Co.), edited by T. D. Fish; "Epitome of Gardening" (Adam Black & Co.), by T. Moore and M. T. Masters; "Agriculture," parts i. & ii. (John Murray), by W. Fream, LL.D.; "Prize Essay on Fruit Culture," by J. Wright; "Physiology of Plants," by Professor Sorauer (Longmans, Green & Co.); "Structural Botany," by Dr. D. H. Scott (Adam Black & Co.); "Natural History of Plants," by Keyner & Oliver (Blackie & Son).

4. The examination will be held simultaneously in as many different centres in Great Britain and Ireland as circumstances may demand.

5. The examination will for the most part be based on the above outline syllabus of "Elementary Principles of Horticultural Operations and Practice," but arrangements will be made, as far as possible, to frame the questions so as to cover the ground of any syllabus sent up for that purpose. It will, however, in all cases, be absolutely essential for students to exhibit a sufficient knowledge of the "Elementary Principles" named in the above syllabus.

6. 300 marks will be given as a maximum. Candidates gaining 200 marks and over will be placed in the first class. Those gaining 150 to 200 will be placed in the second class, and those gaining between 100 and 150 will be placed in the third class. Candidates failing to obtain 100 marks will not be classed.

7. The Royal Horticultural Society will award a Silver Gilt Medal to the candidate gaining the highest number of marks, and will also, if the County Council or other body promoting the lectures wish it, deliver to their candidates certificates of the class in which they shall have passed.

8. County Councils, lecturers, &c., must send in to the Society the actual number of candidates at each proposed centre at least ten days before the examination takes place.

9. Gardeners and students wishing to sit for the examination, but who have not attended any particular series of lectures, must send in their name and address, and also the name and address of some responsible person willing to conduct the examination (*see par. 14*), to the Secretary, R.H.S., 117 Victoria Street, Westminster, at least three weeks before the date of examination.

10. A small capitation fee of 3s. will be charged for every student, in order to partially defray the expenses of the examination.

11. County Councils, lecturers, and others desiring to have an examination held in their neighbourhood, must also send in the full name and address (with designation or occupation) of one responsible person for each proposed centre, who will undertake to supervise the examination in accordance with the Society's rules.

12. N.B.—The Society is willing to hold an examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to examinations will consent to supervise one on the Society's behalf, and in accordance with the rules laid down for its conduct.

13. A stamped and directed envelope must be enclosed with all communications requiring a reply.

SCHOLARSHIPS.

Sir Trevor Lawrence, Bart., President of the Society and Past Master of the Worshipful Company of Gardeners, very kindly offered a scholarship of £25 a year for two years, to be awarded, after the examination of the Royal Horticultural Society in 1895, to the student who should pass highest, if he were willing to accept the conditions attaching thereto. The main outline of these conditions is that the holder must be between the ages of eighteen and twenty-two years, and that he will study gardening for one year at least at the Royal Horticultural Society's Gardens at Chiswick, conforming to the general rules laid down there for students. In the second year of the scholarship he may, if he likes, continue his studies at some other place at home or abroad which shall be approved by the Master of the Worshipful Company of Gardeners and by the Council of the Royal Horticultural Society.

A similar scholarship was presented by Baron Schröder, V.M.H., after the 1896 examination.

Another was given after the 1897 examination by N. N. Sherwood, Esq., V.M.H., Master of the Worshipful Company of Gardeners.

Another similar scholarship has been kindly promised for 1898-9 by G. W. Burrows, Esq., a member of the Court of the same Worshipful Company of Gardeners.

And yet another is promised for 1899-1900 by the Right Hon. the Lord Amherst.

If the student who is at the head of the examination is for any reason unable or unwilling to accept the scholarship, it is then offered to the next highest on the list, and so on throughout the first class.

JOURNAL

OF THE

ROYAL HORTICULTURAL SOCIETY.

VOL. XXI. 1898.

PART III.

FOURTH ANNUAL EXHIBITION OF BRITISH- GROWN FRUIT.

HELD AT THE CRYSTAL PALACE, SEPTEMBER 30,
OCTOBER 1 AND 2, 1897.

HAVING in mind the exceedingly bad blooming time for all hardy fruits in the spring of 1897 everyone anticipated a very small and inferior Show. In both respects the anticipations proved false. The Show was larger than its predecessors (save 1895, the year of the wonderful Apple crop), and the size and quality of the fruit were marvellous. Never has British-grown fruit shown more clearly its pre-eminence in magnificent quality than it did in this year of a most unfavourable spring; and if the Show demonstrated one thing more than another, it was that British-grown fruit need fear no competition, in its season, when grown with skill and attention.

In their Annual Report the Council of the Society draw attention to the fact that the continuance of this particular Show from year to year rests entirely with those interested in British fruit production, for unless at least £100 is annually subscribed towards the Prize List the Show must be dropped. The expenses of such a Show are unavoidably great, and the Society has no

means whatever of recouping itself for the outlay. It cannot, therefore, be too strongly insisted that those who take an interest in the Show and in the welfare of British fruit-growing must help bear the burden by subscribing at least £100 towards the prizes. The addition of new classes is always being urged on the Council; next year (1898) a new Division for market growers is called for, all which makes it only the more necessary that those who are interested in the subject, whether Fellows or not, should join with the Council in providing the necessary financial support for the Show. Subscriptions should be sent at once for the 1898 Show to the Secretary, R.H.S. Office, 117 Victoria Street, Westminster. The following is the

LIST OF SUBSCRIBERS TO THE PRIZE FUND, 1897.

	£	s.	d.
Balderson, H., Corner Hall, Hemel Hempstead	1	1	0
Basham, J., Bassaleg	0	10	6
Brodie of Brodie, Jan, Brodie Castle, N.B.	2	2	0
Browne, Colville, Hextable, Swanley	0	10	6
Bunyard & Co., George, The Royal Nurseries, Maidstone	10	10	0
Bythway, Major, Warborough, Llanelly	1	1	0
Chester Paxton Society, Grosvenor Museum, Chester	1	1	0
Cole, S., Althorpe Gardens, Northampton	0	10	6
Colman, J., Gatton Park, Reigate	2	2	0
Cotterell, W., Oxon Hoath, Tonbridge	0	5	0
Day, Jas., Galloway House Gardens, Garliestown, N.B.	0	5	0
Digby, J. K. Wingfield, Sherborne Castle, Dorset	1	0	0
Douglas, James, Edenside, Great Bookham, Surrey	1	1	0
Dunn, Malcolm, Dalkeith Palace Gardens, N.B.	2	2	0
Edwards, R., Beechey Lees, Sevenoaks	0	5	0
Empson, W. J., Amphill House Gardens, Beds	0	10	6
Fennell, Geo., Fairlawn Gardens, Tonbridge	0	5	0
Harris, F., Eastnor Gardens, Ledbury	0	7	6
Haywood, T. B., Woodhatch, Reigate	2	2	0
Hill, D., Herga, Watford	0	10	0
Kay, Peter, Claignar, Finchley	1	1	0
Kemp, A., Coolhurst Gardens, Horsham	0	5	0
Laing & Sons, J., Forest Hill, S.E.	2	2	0
Low & Co., H., Upper Clapton, E.	2	2	0
McIndoe, J., Hutton Hall Gardens, Guisborough	1	0	0
McKenzie, J., Linton	0	10	0
Merryweather, H., Southwell	6	0	0
Nicholson, J., Sewardstone Lodge Gardens, Chingford	0	5	0
Pearson & Sons, J. R., Chilwell, Notts	6	5	0
Peed & Sons, J., Roupell Park Nurseries, West Norwood, S.E.	2	2	0
Perkins & Sons, T., Northampton	1	1	0
Rivers & Son, T., Sawbridgeworth, Herts	5	5	0
Ross, C., Welford Park Gardens, Newbury	0	10	6
Rothschild, Leopold de. New Court, St. Swithin's Lane, E.C.	3	3	0
Sanders, R. C., Halton Gardens, Tring	0	10	6
Schröder, Baron, The Dell, Staines	5	0	0
Sherwood, N., Streatham	1	1	0

	£	s.	d.
Slogrove, William, Gatton, Reigate	0	5	0
Smith, Martin R., Warren House, Hayes, Kent	2	2	0
Smith, R., Shrewsbury	1	1	0
Spooner & Sons, S., Hounslow	1	1	0
Sutton & Sons, Reading	5	0	0
Sydenham, R., Tenby Street, Birmingham	1	1	0
Tidy, W., Stanmore Hall Gardens, Middlesex	0	5	0
Turton, T., Maiden Erlegh, Reading	0	10	6
Veitch, Harry J., Redcliffe Gardens, S.W.	5	0	0
Veitch & Sons, J., Royal Exotic Nurseries, Chelsea	5	0	0
Veitch & Sons, R., Royal Nurseries, Exeter	1	1	0
Walker, J., Ham Common, Surrey	1	1	0
Wastenobie, Market Harborough	5	0	0
Wells, B., Crawley	0	10	0
Wheeler & Son, J. C., Kingsholm Nursery, Gloucester	1	1	0
Wingfield, A. H., Ampthill	1	1	0
Wingfield, Mrs., Ampthill House, Beds	1	1	0
Woodward, Geo., Barham Court Gardens, Teston, Maidstone	1	0	0

The following table may be interesting as comparing the number of dishes of each fruit exhibited in each of the four years during which the Show has been held. Only the exhibits under the Schedule have been included, it having been found impossible to enumerate everything shown in classes not for competition.

Dishes of	1894	1895	1896	1897
Apples	1,027	1,938	1,083	1,485
Apricots	2	1	1	1
Bananas	—	1	—	—
Bullaces	5	3	1	3
Cherries	7	12	6	1
Damsons	6	18	4	5
Figs	4	9	7	26
Gooseberries	1	—	—	—
Grapes	105	97	135	120
Medlars	—	2	3	5
Melons	—	10	7	8
Nectarines	15	18	4	11
Nuts	—	26	19	10
Passiflora	—	—	1	1
Peaches	51	80	24	77
Pears	829	779	795	677
Pines	—	—	5	3
Plums	90	101	38	115
Quinces	6	14	17	1
Tomatos	—	67	2	3
Total	2,148	3,176	2,152	2,552
Entries for competition	1,301	1,783	1,234	1,329
Visitors	23,680	36,293	26,499	27,242

For the following table we are indebted to the kindness of the Editor of the *Gardeners' Magazine* :—

APPLES.

Varieties	Dishes			Varieties	Dishes		
	1897	1896	1895		1897	1896	1895
Ribston Pippin ...	73	61	111	Tyler's Kernel ...	8	5	9
Cox's Orange ...	66	75	122	Claygate Pearmain ...	7	8	2
Warner's King ...	56	41	72	Devonshire Quarren-			
King of the Pippins	52	45	98	den ...	7	1	2
Blenheim Orange ...	43	28	32	Hollandbury ...	7	6	6
Worcester Pearmain	42	31	49	Lady Sudeley ...	7	2	5
Peasgood's Nonesuch	39	33	79	Mannington Pearmain	7	6	7
Cox's Pomona ...	38	27	53	Striped Beefing ...	7	5	6
Lord Derby ...	34	27	61	Yorkshire Beauty ...	7	1	3
Bramley's Seedling	33	17	26	Grenadier ...	6	5	6
Lane's Prince Albert	32	33	37	Waltham Abbey Seed-			
Ecklinville ...	30	12	33	ling ...	6	8	8
Emperor Alexander	27	34	51	Belle Dubois ...	5	0	7
The Queen ...	27	20	49	Crimson Quoining ...	5	0	1
Dumelow's Seedling	25	18	29	Egremont Russet ...	5	1	6
Lord Suffield ...	25	15	53	Gravenstein ...	5	4	4
Cellini ...	23	21	34	Hawthornden ...	5	0	3
Baumann's Reinette	22	18	17	Kentish Fillbasket ...	5	0	0
Beauty of Kent ...	22	8	14	Mabbot's Pearmain ...	5	9	3
Gascoyne's Scarlet...	22	16	28	New Northern Green-			
Potts' Seedling ...	22	14	34	ing ...	5	4	17
Bismarck... ..	21	22	36	Reinette de Canada...	5	5	13
Loddington or Stone's	21	18	29	Royal Jubilee ...	5	8	13
Fearn's Pippin ...	20	17	19	Allington Pippin ...	4	1	0
Golden Noble... ..	20	19	29	Autumn Pearmain ...	4	1	0
Mère de Menage ...	20	21	13	Duchess' Favourite ...	4	4	3
Stirling Castle ...	20	12	38	Duchess of Gloucester	4	0	1
Alfriston ...	19	15	22	Hormead Pearmain ...	4	6	4
American Mother ...	19	17	23	Manks Codlin ...	4	3	6
Tower of Glamis ...	18	12	27	Wadhurst Pippin ...	4	1	2
Court Pendu Plat ...	16	12	4	Allen's Everlasting ...	3	1	0
Margil ...	16	13	19	Barnack Beauty... ..	3	4	0
Sandringham ...	16	12	5	Calville Rogue Pré-			
Spencer's Favourite	14	2	17	coce ...	3	4	6
Washington ...	14	13	11	Domino ...	3	0	0
Lady Henniker ...	13	5	20	Gold Medal ...	3	2	4
Frogmore Prolific ...	11	4	10	Hanwell Souring ...	3	1	1
Wealthy ...	11	4	8	Hoary Morning ...	3	6	5
Duchess of Olden-				Kentish Pippin ...	3	1	0
burg ...	10	2	10	Kerry Pippin ...	3	8	4
Lord Grosvenor ...	10	6	18	Keswick Codlin ...	3	2	2
New Hawthornden	10	11	34	Mrs. Barron ...	3	3	4
Newton Wonder ...	10	12	16	Red Ribbed Greening	3	0	2
Brownlees' Russet	9	7	3	Rosemary Russet ...	3	6	12
Golden Spire ...	9	10	8	Round Winter Nonesuch	3	0	4
Adams' Pearmain ...	8	4	18	Royal Russet ...	3	0	2
Annie Elizabeth ...	8	6	11	Scarlet Pearmain ...	3	2	1
Gloria Mundi ...	8	14	13	Twenty-Ounce ...	3	3	4
Jefferson's ...	8	4	6	Vicar of Beighton ...	3	1	0
King of Tomkins				Yellow Ingestrie ...	3	13	9
County... ..	8	2	7	Banks' Exhibition ...	2	1	1

Varieties	Dishes			Varieties	Dishes		
	1897	1896	1895		1897	1896	1895
Beauty of Hants ...	2	4	2	Duke of Devonshire ...	1	3	2
Bedfordshire Foundling	2	1	4	Emily Childs ...	1	0	0
Belle de Pontoise ...	2	5	3	Evagil ...	1	0	0
Betty Geeson ...	2	1	1	Fairmaid of Taunton...	1	0	0
Braddick's Nonpareil...	2	4	0	Farmer's Seedling ...	1	1	1
Calville Malingre ...	2	0	0	Forge Apple ...	1	0	0
Castle Major ...	2	1	2	Flanders Pippin...	1	1	2
Colonel Vaughan ...	2	5	3	Flower of Kent ...	1	0	0
Councillor ...	2	0	1	Galloway Pippin ...	1	1	1
Donoughmore ...	2	0	0	Gibbon's Russet...	1	0	0
Dutch Codlin ...	2	2	1	Golden Ball ...	1	0	0
Dutch Mignonne ...	2	1	4	Golden Reinette ...	1	1	1
Foster's Seedling ...	2	1	2	Golden Russet ...	1	1	1
Greenup's Pippin ...	2	0	5	Gospatrik ...	1	0	0
Hall Door ...	2	0	0	Graham ...	1	0	0
Hambledon Deux Ans	2	1	3	Grand Duke Constan-			
Harvey's Wilts Defiance	2	1	0	tine ...	1	1	1
James Grieve ...	2	1	0	Green Costard ...	1	0	1
Kilderkin ...	2	0	0	Hambling's Seedling...	1	1	1
Malster ...	2	0	3	Herefordshire Beefing	1	0	0
Miller's Seedling ...	2	0	0	Herefordshire Codlin...	1	0	0
Munster Pippin ...	2	0	0	Herefordshire Under-			
Roundway Magnum Bo-				leaf ...	1	0	0
num ...	2	0	1	Herefordshire Pearmain	1	0	2
Seaton House ...	2	2	1	Holland Apple ...	1	0	0
Scarlet Nonpareil ...	2	11	5	Holland Pippin ...	1	0	0
Scarlet Tiffin ...	2	0	1	Kirke's Fame ...	1	0	0
Small's Admirable ...	2	2	1	Lewis' Incomparable...	1	1	1
Stone Peach ...	2	0	0	London Pippin ...	1	0	0
Sturmer Pippin ...	2	11	2	McDonald ...	1	0	0
Summer Costard ...	2	0	0	Mrs. Phillimore ...	1	0	0
Tibbett's Pearmain ...	2	3	4	Murfit's Seedling ...	1	1	1
Tom Putt ...	2	1	2	New White Moss ...	1	0	0
White Square ...	2	0	0	Northern Greening ...	1	0	1
Winter Peach ...	2	4	1	Old Quarrenden ...	1	0	0
Baldwin ...	1	0	0	Paraquet ...	1	0	0
Baxter's Pearmain ...	1	0	0	Pearce's Seedling ...	1	0	0
Beauty of Bath ...	1	0	0	Reinette Grise ...	1	0	0
Beauty of the Day ...	1	0	0	Rivers' Codlin ...	1	0	0
Bess Pool ...	1	0	6	Rymer ...	1	0	0
Bietigheimer Red ...	1	3	5	St. Edmund's Pippin	1	0	1
Bowhill Pippin ...	1	1	2	Smart's Prince Arthur	1	0	0
Brabant Bellefleur ...	1	1	3	Sops in Wine ...	1	0	0
Bucombe Fairmaid ...	1	0	0	Stoup Leadington ...	1	1	1
Bull's Golden Reinette	1	0	0	Tewkesbury Baron ...	1	0	0
Calville Blanche ...	1	1	1	Transparent de Cronsels	1	0	1
Catshead ...	1	1	1	Wagener ...	1	0	0
Chateley's Kernel ...	1	1	0	White Apple ...	1	1	0
Christmas Pearmain ...	1	0	0	Winter Margil ...	1	0	0
Cockle's Pippin ...	1	3	2	Winter Quoining ...	1	4	3
Cornish Aromatic ...	1	1	4	Winter Ribston ...	1	3	1
Cornish Giant ...	1	0	0	Williams' Favourite ...	1	1	0
Court of Wick ...	1	1	2	Wyken Pippen ...	1	1	2
Dr. Harvey ...	1	0	0	Yorkshire Greening ...	1	1	1

APRICOTS.

Moor Park ...	1	1	1
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BULLACES.													
Varieties		Dishes						Varieties		Dishes			
		1897	1896	1895						1897	1896	1895	
Common Bullace		...	...	...	...	...	...			3	1	3
CHERRIES.													
Morello		...	...	...	...	...	...			1	6	12
DAMSONS.													
Cheshire		...	...	1	1	2	Crittenden's	...	...	1	0	0
Common		...	...	1	1	0	Prune	...	...	2	1	6
FIGS.													
Brown Turkey		...	...	14	4	4	Black Douro	...	...	1	0	0
Brunswick		...	...	4	0	0	Rond Noir	...	...	1	0	0
Negro Largo		...	...	3	2	1	White Ischia	...	...	1	0	1
Reculvers		...	...	2	0	0						
GRAPES.													
Muscat of Alexandria		24	30	21	Buckland Sweetwater		3	3	2				
Alicante		...	...	14	24	17	Chasselas Napoleon		3	0	2	
Gros Maroc		...	...	14	14	13	Gros Guillaume		3	1	3	
Black Hamburgh		...	...	11	12	8	Mrs. Pearson		3	3	3	
Gros Colmar		...	...	9	4	5	Dr. Hogg		2	0	0	
Madresfield Court		...	...	8	12	5	Golden Queen		2	0	1	
Foster's Seedling		...	...	6	7	3	Sweetwater		2	1	0	
Mrs. Pince's Bk. Muscat		...	...	5	5	4	Black Morocco		1	0	0	
Lady Downe's		...	...	5	8	6	Trebiano		1	1	1	
Alnwick Seedling		...	...	4	0	1						
MEDLARS.													
Dutch		2	0	1	Nottingham		1	0	1
Common		1	3	0	Royal		1	0	0
MELONS.													
Hero of Lockinge		2	2	3	Best of All		1	0	0
Seedling		2	1	0	La Favorite		1	0	0
Eastnor Castle		1	0	0	Scarlet Model		1	0	0
NECTARINES.													
Pineapple		4	0	7	Elruge		1	0	5
Victoria		3	1	1	Prince of Wales		1	0	0
Albert Victor		...	...	2	0	0						
NUTS.													
Cobnuts		4	6	9	Filberts		2	0	7
Walnuts		3	7	6	Hazel		1	2	2
PASSION FLOWER.													
Passiflora edulis		1	1	0
PEACHES.													
Sea Eagle		21	6	17	Barrington		2	0	11
Princess of Wales		9	1	4	Gladstone		2	0	4
Walburton Admirable		7	1	10	Albatross		1	0	1
Lady Palmerston		5	3	0	Bellegarde		1	1	1
Late Admirable		5	1	5	Champion		1	0	0
Golden Eagle		4	0	4	Chancellor		1	0	0
Nectarine		4	2	3	Exquisite		1	2	1
Salway		4	1	0	Mrs. Sharpe		1	0	0
Lord Palmerston		3	2	5	Royal George		1	0	1
Prince of Wales		3	0	7	Stirling Castle		1	0	0

PEARS.

Varieties	Dishes			Varieties	Dishes		
	1897	1896	1895		1897	1896	1895
Pitmaston Duchesse ...	46	...55	...69	Chaumontel ...	3	... 4	... 0
Louise Bonne of Jersey	36	...33	...55	Comte de Lamy...	3	... 1	... 1
Doyenné du Comice ...	35	...39	...28	Seckle ...	3	... 6	... 1
Beurré Diel...	32	...38	...35	Triomphe de Jodoigne	3	... 1	... 4
Beurré Superfin ...	31	...24	...16	Beurré de Jonghe ...	2	... 1	... 0
Durondeau ...	26	...36	...42	Beurré Fouqueray ...	2	... 3	... 0
Marie Louise ...	23	...40	...54	Beurré Jean Van Geert	2	... 4	... 2
Marie Louise d'Uccle...	20	... 8	...15	Beurré Rance ...	2	... 8	... 3
Beurré Hardy ...	18	...24	...16	Bishop's Thumb ...	2	... 0	... 1
Duchesse d'Angoulême	18	...28	...17	Duchesse de Bordeaux	2	... 3	... 3
Beurré Bachelier ...	17	...14	... 5	Fondante de Cuerne ...	2	... 0	... 0
Josephine de Malines...	17	...20	... 13	Hacon's Incomparable	2	... 7	... 1
Catillac ...	16	... 7	...15	Huyshe's Victoria ...	2	... 1	... 1
Doyenné Boussoch ...	15	... 4	...14	Jargonelle ...	2	... 0	... 1
Glou Morceau ...	15	...25	...19	King Edward ...	2	... 3	... 3
Beurré Bosc ...	14	...14	... 6	Napoleon ...	2	... 3	... 1
Winter Nelis ...	14	...25	...12	President d'Osmonville	2	... 5	... 0
Maréchal de Cour ...	13	...13	...17	Soldat Laboureur ...	2	... 2	... 1
Easter Beurré ...	11	...20	... 4	Williams' Bon Chrétien	2	... 0	...30
Bergamotte d'Esperen	10	...14	... 1	Althorpe Crassane ...	1	... 1	... 0
Fondante d'Automne...	10	... 5	...15	Ambrosia ...	1	... 0	... 0
Gansel's Bergamot ...	10	... 7	... 5	Autumn Bergamotte ...	1	... 2	... 0
General Tottleben ...	10	... 9	...14	Autumn Nelis ...	1	... 1	... 0
Uvedale's St. Germain	10	...17	...15	Belle de Bruxelles ...	1	... 0	... 0
Beurré Clairgeau ...	9	...16	...10	Beurré d'Anjou ...	1	... 5	... 0
Beurré d'Amanlis ...	9	... 1	...14	Beurré d'Aremberg ...	1	... 3	... 1
Souvenir du Congrès...	9	...12	...29	Beurré Goubalt ...	1	... 0	... 0
Thompson's ...	9	... 8	... 5	Beurré Niger ...	1	... 0	... 0
Conference ...	8	... 4	... 5	Comte de Flanders ...	1	... 3	... 2
Madame Treyve ...	8	... 1	... 9	Directeur Alphand ...	1	... 1	... 1
Brockworth Park ...	7	... 8	...12	Directeur Hardy ...	1	... 0	... 0
Marie Benoist ...	7	... 5	... 4	Dr. Joubert...	1	... 1	... 0
Brown Beurré ...	6	... 6	... 2	Elton ...	1	... 0	... 0
Emile d'Heyst ...	6	...11	...12	Fertility ...	1	... 1	... 4
Marguerite Marillat ...	6	... 1	... 5	Flemish Beauty ...	1	... 1	... 5
Nouvelle Fulvie ...	6	... 8	... 7	Fondante de Charneu	1	... 0	... 0
Beurré Baltet Père ...	5	... 6	... 2	Forelle... ..	1	... 3	... 2
Fondante de Thirriot	5	... 4	... 2	Gros Colmar ...	1	... 0	... 0
Princess ...	5	... 6	... 9	Knight's Monarch ...	1	... 5	... 0
Beurré de Capiaumont	4	... 3	... 3	Le Lectier ...	1	... 0	... 1
Beurré Sterckmans ...	4	... 2	... 2	Léon Leclerc ...	1	... 0	... 2
Gratioli of Jersey ...	4	... 0	... 4	Marie Lye Baltet ...	1	... 0	... 0
Grosse Calebasse ...	4	... 6	... 9	Nec Plus Meuris ...	1	... 1	... 0
Nouveau Poiteau ...	4	... 2	... 0	Passe Colmar ...	1	... 3	... 0
Olivier de Serres...	4	... 1	... 0	Triomphe de Vienne...	1	... 2	...12
Vicar of Winkfield ...	4	... 6	... 9	Van Mons. Léon Leclerc	1	... 7	... 7
Bellissime d'Hiver ...	3	... 3	... 2	Verulam ...	1	... 3	... 2
Beurré Dumont ...	3	... 1	... 0	Zépherin Grégoire ...	1	... 2	... 0

PINEAPPLES.

Smooth Cayenne ...	2	... 2	... 0	Queen ...	1	... 0	... 0
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PLUMS.

Coe's Golden Drop ...	34	...10	...32	Reine Claude de Bavay	7	... 2	... 7
Monarch ...	9	... 6	... 6	Bryanston Gage...	5	... 4	... 4
Pond's Seedling...	9	... 1	... 6	Grand Duke ...	5	... 0	... 8

PLUMS—*continued.*

Varieties	Dishes			Varieties	Dishes		
	1897	1896	1895		1897	1896	1895
Jefferson	4	3	2	Autumn Compote ...	1	0	0
Guthrie's Golden ...	3	0	2	Belle de Septembre ...	1	2	7
Magnum Bonum ...	3	1	4	Blue Impératrice ...	1	0	2
Victoria	3	0	1	Cloth of Gold ...	1	0	0
Archduke	2	0	2	Coe's Violet ...	1	0	0
Brahya's Green Gage ...	2	1	1	Count Althann's Gage	1	0	0
Cox's Emperor	2	1	2	Goliath	1	0	0
Late Transparent ...	2	1	0	Golden Castle ...	1	0	0
Lawrence's Favourite	2	0	1	Impériale de Milan ...	1	1	1
Prince Engelbert ...	2	0	0	Kirke's	1	1	2
Prince of Wales ...	2	0	0	Late Purple Gage ...	1	0	1
Transparent Gage ...	2	0	2	Le Mot Sang ...	1	0	0
Washington	2	0	0	Purple Gage	1	0	1
Wyedale	2	1	1				

QUINCES.

Pear-shaped	1	17	12
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TOMATOS.

Conference	2	1	3
Laxton's Open Air ...	1	0	0

OFFICIAL PRIZE LIST.

DIVISION I.

Fruits grown under Glass or otherwise.

Open to Gardeners and Amateurs only.

NOTE.—Exhibitors could compete in one Class only of Classes 1, 2; and of Classes 3, 4.

Class 1.—Collection of 12 dishes of Ripe Dessert Fruit:—6 kinds at least; only 1 Pine, 1 Melon, 1 Black and 1 White Grape, allowed; not more than 2 varieties of any other kind, and no two dishes of the same variety.

First Prize, £7. 10s.; Second, £5; Third, £2. 10s.

1. Lady Henry Somerset, Ledbury (gr. F. Harris).
2. Earl of Harrington, Derby (gr. J. Goodacre).
3. Sir J. W. Pease, Bart., M.P., Guisboro' (gr. J. McIndoe, V.M.H.).

Class 2.—Collection of 8 dishes of Ripe Dessert Fruit:—4 kinds at least; only 1 Melon, 1 Black and 1 White Grape, allowed; not more than 2 varieties of any other kind, and no two dishes of the same variety. Pines excluded.

First Prize, £5; Second, £3; Third, £2.

1. Messrs. de Rothschild, Acton (gr. G. Reynolds).
2. Mrs. Wingfield, Ampthill (gr. W. J. Empson).
3. W. K. D'Arcy, Esq., Stanmore (gr. W. Tidy).

Class 3.—Grapes, 6 distinct varieties; 2 bunches of each, both Black and White must be represented.

First Prize, £5; Second, £3; Third, £2.

1. Messrs. de Rothschild, Acton.
2. C. Bayer, Esq., Forest Hill (gr. W. Taylor).
3. Earl of Harrington, Derby.

Class 4.—Grapes, 3 distinct varieties, 2 bunches of each.

First Prize, £2. 10s.; Second, £1. 10s.; Third, £1.

1. Sir Geo. Russell, Bart., M.P., Reading (gr. F. Cole).
2. Mr. J. Jones, Malvern.
3. Lady Henry Somerset, Ledbury.

Class 5.—Grapes, Black Hamburgh, 3 bunches.

First Prize, £1. 10s.; Second, £1; Third, 10s.

1. J. W. Fleming, Esq., Romsey (gr. W. Mitchell).
2. C. Bayer, Esq., Forest Hill.
3. Messrs. de Rothschild, Acton.

Class 6.—Grapes, Madresfield Court, 3 bunches.

First Prize, £1. 10s.; Second, £1; Third, 10s.

1. C. Bayer, Esq., Forest Hill.
2. W. K. D'Arcy, Esq., Stanmore.
3. Mrs. Wingfield, Ampthill.

Class 7.—Grapes, Gros Colmar or Gros Maroc, 3 bunches of either.

First Prize, £1. 10s.; Second, £1; Third, 10s.

1. Mr. J. Jones, Malvern.
2. Messrs. de Rothschild, Acton.
3. Sir George Russell, Bart., M.P., Reading.

Class 8.—Grapes, Alicante, 3 bunches.

First Prize, £1. 10s.; Second, £1; Third, 10s.

1. Sir George Russell, Bart., M.P., Reading.
2. Mr. J. Bury, Byfleet.
3. H. Tate, Esq., Streatham (gr. W. Howe).

Class 9.—Grapes, Lady Downes (Black), 3 bunches.

First Prize, £1. 10s.; Second, £1; Third, 10s.

1. W. K. D'Arcy, Esq., Stanmore.
2. Mrs. Wingfield, Ampthill.
3. C. R. Scrase-Dickins, Esq., Horsham (gr. A. Kemp).

Class 10.—Grapes, any other Black Grape, 3 bunches.

First Prize, £1. 10s.; Second, £1; Third, 10s.

1. J. W. Fleming, Chilworth.
2. R. Ovey, Esq., Henley-on-Thames (gr. W. Smith).
3. W. K. D'Arey, Esq., Stanmore.

Class 11.—Grapes, Muscat of Alexandria, 3 bunches.

First Prize, £2; Second, £1. 10s.; Third, 15s.

1. Sir George Russell, Bart., M.P., Reading.
2. Earl of Harrington, Derby.
3. Messrs. de Rothschild, Acton.

Class 12.—Grapes, any other White Grapes, 3 bunches.

First Prize, £1. 10s.; Second, £1; Third, 10s.

1. Messrs. de Rothschild, Acton.
2. C. Bayer, Esq., Forest Hill.
3. Miss Ridge, Englefield Green (gr. G. Lane).

Class 13.—Figs, 1 dish of one variety.

First Prize, 10s.; Second, 7s.; Third, 3s.

1. C. H. Berners, Esq., Ipswich (gr. W. Messenger).
2. C. E. Strachan, Esq., Hemel Hempstead (gr. H. Folkes).
3. J. W. Fleming, Esq., Chilworth.

Class 14.—Collection of Hardy Fruit, not exceeding 50 dishes, grown entirely in the open.

First Prize, £4. 10s.; Second, £3; Third, £1. 10s.

1. Earl Percy, Brentford (gr. G. Wythes).
2. Col. E. Brymer, M.P., Dorchester (gr. J. Powell).
3. Lord Foley, Esher (gr. J. Miller).

Class 15.—Collection of Hardy Fruit, not exceeding 36 dishes, grown partly or entirely under glass to illustrate Orchard House Culture.

First Prize, £4. 10s.; Second, £3.

1. Sir Mark W. Collet, Bart., Sevenoaks (gr. R. Potter).
2. Sir J. W. Pease, Bart., M.P., Guisboro'.

DIVISION II.

Open to Nurserymen only.

NOTE.—As in all other Divisions, so also in Division II., all the Exhibits must have been grown by the Exhibitor. Exhibitors must not compete in both Classes 18 and 19. In this Division the number of Fruits was not limited, and the Baskets or Dishes might, if desired, be of a size not exceeding 15 inches in diameter if circular, or 19 in. by 15 in. if rectangular.

Class 16.—Collection of Fruit Trees bearing Fruit, in pots.

Prizes, Gold, Silver Gilt, or Silver Medals. (Fig. 86.)

1. Messrs. Rivers & Son, Sawbridgeworth.

Class 17.—Collection of Hardy Fruits, grown partly or entirely under Glass, to illustrate Orchard House Culture.

Prizes, Gold, Silver Gilt, or Silver Medals.

1. Messrs. George Bunyard & Co., Maidstone.

Class 18.—Collection of not less than 75, or more than 100, distinct varieties of Hardy Fruits, in baskets or dishes, grown entirely in the open air; to be arranged on a table of about 24 ft. by 6 ft. or an equivalent space; Foliage plants may be added and branches of any fruit-bearing trees or bushes.

Prizes, Gold or Silver Gilt, or Silver Medals.

1. Messrs. George Bunyard & Co., Maidstone.
2. Mr. H. Berwick, Sidmouth.

Class 19.—Collection of not less than 30, or more than 50, distinct varieties of Hardy Fruits, in baskets or dishes, grown entirely in the open air; to be arranged on a table about 24 ft. by 3 ft. or an equivalent space; Foliage plants may be added and branches of any fruit-bearing trees or bushes.

Prizes, Silver Gilt or Silver Medals.

1. Mr. J. Colwill, Sidmouth.
2. Mr. A. Wyatt, Hounslow.

Class 20.—Collection of not less than 30, or more than 50, distinct varieties of Pears, in baskets or dishes, grown entirely in the open air; to be arranged on a table of about 24 ft. by 3 ft. or an equivalent space; Foliage plants may be added and branches of any fruit-bearing trees or bushes.

Prizes, Silver Gilt or Silver Medals.

1. Mr. H. Berwick, Sidmouth.



FIG. 86.—APPLE TREE IN POT (*Gardeners' Magazine*).

Class 21.—Collection of not less than 30, or more than 50, distinct varieties of Apples, in baskets or dishes, grown entirely in the open air; to be arranged on a table of about 24 ft. by 3 ft. or an equivalent space; Foliage plants may be added and branches of any fruit-bearing trees or bushes.

Prizes, Silver Gilt or Silver Medals.

1. Mr. J. Basham, Newport, Mon.

Class 22.—Collection of fruit-bearing branches of sprays, of any kind or variety of various fruit bushes or trees, to occupy a table not exceeding 24 ft. by 3 ft. No awards.

DIVISION III.

Fruits grown in the Open Air.

Open to Gardeners and Amateurs only.

NOTE.—Exhibitors could compete in one Class only of Classes 23, 24, 25; of 26, 27; of 29, 30; of 31, 32, 33, 34; of 35, 36; of 37, 38; of 39, 40; of 41, 42; of 43, 44.

Class 23.—Apples, 24 dishes, distinct, 16 Cooking, 8 Dessert. The latter to be placed in the front row.

First Prize, £4; Second, £2; Third, £1. 10s.

1. Roger Leigh, Esq., Maidstone (gr. G. Woodward).
2. C. Lee Campbell, Esq., Ross (gr. C. Bayford).
2. Sir E. G. Loder, Bart., Horsham (gr. G. Goldsmith).

Class 24.—Apples, 12 dishes, distinct, 8 Cooking, 4 Dessert. The latter to be placed in the front row.

First Prize, £2; Second, £1; Third, 15s.

1. J. K. D. W. Digby, Esq., Sherborne (gr. W. G. Pragnell).
2. T. W. Startup, Esq., Maidstone (gr. B. Miller).
3. C. R. W. Adeane, Esq., Cambridge (gr. J. Hill).

Class 25.—Apples, 9 dishes, distinct, 6 Cooking, 3 Dessert. The latter to be placed in the front row.

First Prize, £1. 10s.; Second, 15s.

1. Mrs. Crawford, Gatton (gr. W. Slogrove).
2. J. T. Charlesworth, Esq., Nutfield (gr. T. W. Herbert).

Class 26.—Cooking Apples, 6 dishes, distinct.

First Prize £1; Second, 15s.; Third, 10s.

1. Roger Leigh, Esq., Maidstone.
2. T. Oliverson, Esq., East Sutton (gr. W. Lewis).
3. Dowager Lady Freake, Twickenham (gr. W. Rickwood).

Class 27.—Cooking Apples, 3 dishes, distinct.

First Prize, 10s. ; Second, 7s. ; Third, 5s.

1. Sir E. G. Loder, Bart., Horsham.
2. Colonel E. Brymer, M.P., Dorchester.
3. Mr. A. Brook, Mereworth.

Class 28.—Six dishes of Bramley's Seedling Apple. Prizes given by Messrs. H. Merryweather, The Nurseries, Southwell.

First Prize, £3 ; Second, £2 ; Third, £1.

1. J. Colman, Esq., Gatton (gr. W. King).
2. J. Hargreaves, Esq., Reading (gr. T. Turton).
3. H. H. Hurnard, Esq., Attleborough (gr. J. Bowery).

Class 29.—Dessert Apples, 6 dishes, distinct.

First Prize, £1 ; Second, 15s. ; Third, 10s.

1. Roger Leigh, Esq., Maidstone.
2. T. W. Startup, Esq., Maidstone.
3. Sir E. G. Loder, Bart., Horsham.

Class 30.—Dessert Apples, 3 dishes, distinct.

First Prize, 10s. ; Second, 7s. ; Third, 5s.

1. C. Lee Campbell, Esq., Ross.
2. C. R. Scrase-Dickins, Esq., Horsham.
3. Sir Mark Collet, Bart., Sevenoaks.

Class 31.—Dessert Pears, 12 dishes, distinct.

First Prize, £2. 15s. ; Second, £1. 15s. ; Third, £1.

1. Roger Leigh, Esq., Maidstone.
2. Sir E. G. Loder, Bart., Horsham.
3. Colonel E. Brymer, M.P., Dorchester.

Class 32.—Dessert Pears, 9 dishes, distinct.

First Prize, £2 ; Second, £1 ; Third, 15s.

1. Sir William N. Geary, Bart., Tonbridge (gr. W. Cotterell).
2. G. R. Brougham, Esq., Carshalton (gr. W. Jones).
3. Dowager Lady Freake, Twickenham (gr. A. Rickwood).

Class 33.—Dessert Pears, 6 dishes, distinct.

First Prize, £1. 10s. ; Second, 15s. ; Third, 10s.

1. C. H. Berners, Esq., Ipswich.
2. Mrs. Crawford, Gatton.
3. Rev. O. L. Powels, Weybridge (gr. A. Basill).

Class 34.—Dessert Pears, 3 dishes, distinct.

First Prize, 15s. ; Second, 10s. ; Third, 5s.

1. G. N. Field, Esq., Sevenoaks (gr. R. Edwards).
2. W. M. Cazalet, Esq., Tonbridge (gr. G. Fennell).
3. O. A. Smith, Esq., East Grinstead (gr. C. Harris).

Class 35.—Cooking Pears, 3 dishes, distinct.

First Prize, 15s. ; Second, 10s. ; Third, 5s.

1. Roger Leigh, Esq., Maidstone.
2. Sir E. G. Loder, Bart., Horsham.
3. F. M. Lonergan, Esq., Reading (gr. R. Chamberlain).

Class 36.—Cooking Pears, 1 dish, of one variety.

First Prize, 7s. ; Second, 5s. ; Third, 3s.

1. A. O. Smith, Esq., East Grinstead.
2. Mr. H. Stock, Petersham.
3. H. Padwick, Esq., Horsham (gr. J. Webb).

Class 37.—Peaches, 3 dishes, distinct.

First Prize, £1. 10s. ; Second, £1 ; Third, 10s.

1. Roger Leigh, Esq., Maidstone.
2. Lady Henry Somerset, Ledbury (gr. F. Harris).
3. Mrs. Druce, Upper Gatton (gr. W. Mancey).

Class 38.—Peaches, 1 dish of one variety.

First Prize, 10s. ; Second, 7s. ; Third, 3s.

1. J. W. Fleming, Esq., Chilworth.
2. Miss Ridge, Englefield Green.
3. Sir E. G. Loder, Bart., Horsham.

Class 39.—Nectarines, 3 dishes, distinct.

First Prize, £1. 10s.

1. Lady Henry Somerset, Ledbury.

Class 40.—Nectarines, 1 dish of one variety.

First Prize, 10s. ; Second, 7s. ; Third, 3s.

1. Hon. H. W. Long, M.P., Trowbridge (gr. W. Strugnell).
2. C. R. W. Adeane, Esq., Cambridge.
3. F. W. Marter, Esq., Byfleet (gr. P. Bradley).

Class 41.—Plums, 4 dishes of dessert, distinct.

First Prize, £1 ; Second, 15s. ; Third, 10s.

1. C. E. Strachan, Esq., Hemel Hempstead (gr. J. Folkes).
2. Lord Braybrooke, Saffron Walden (gr. Jas. Vert).
3. Right Hon. W. H. Long, M.P., Trowbridge.

Class 42.—Plums, 1 dish of Dessert, of one variety, not Gages.

First Prize, 7s. ; Second, 5s. ; Third, 3s.

1. Lord Braybrooke, Saffron Walden.
2. J. Hargreaves, Esq., Reading.
3. G. N. Field, Esq., Sevenoaks.

Class 43.—Plums, 4 dishes of Cooking, distinct.

First Prize, £1 ; Second, 15s. ; Third, 10s.

1. Earl of Harrington, Derby.
2. Thos. Gooch, Esq., Hemel Hempstead (gr. C. Sim).
3. Earl of Galloway, Garliestown, N.B. (gr. C. Day).

Class 44.—Plums, 1 dish of Cooking, of one variety.

First Prize, 7s. ; Second, 5s. ; Third, 3s.

1. Rev. H. Golding Palmer, Reading (gr. B. Osborne).
2. Thos. Gooch, Esq., Hemel Hempstead.
3. Earl of Harrington, Derby.

Class 45.—Gage Plums, 1 dish.

First Prize, 7s. ; Second, 5s. ; Third, 3s.

1. C. H. Berners, Esq., Ipswich.
2. Hon. G. M. Fortescue, Maidenhead (gr. C. Herrin).
3. Rev. H. Golding Palmer, Reading.

Class 46.—Damsons, Prunes, and Bullaces, 4 dishes, distinct.

First Prize, 15s.

1. W. M. Cazalet, Esq., Tonbridge (gr. G. Fennell).

DIVISION IV.

Single Dishes of Fruit grown in the open air.

Open to Gardeners and Amateurs only.

Except in Classes 93 and 94 given by Messrs. Pearson, of Chilwell, the Prizes in Division IV. were always First, 7s. ; Second, 5s. ; Third, 3s.

Class 47.—Adams' Pearmain.

1. Duchess of Cleveland, Battle (gr. W. Camm).
2. Sir E. G. Loder, Bart., Horsham.
3. Roger Leigh, Esq., Maidstone.

Class 48.—Allen's Everlasting.

1. Colonel E. Brymer, M.P., Dorchester.
2. Hon. F. W. Buxton, Sawbridgeworth (gr. W. H. Godden).
3. Mr. J. Spottiswood, Brighton.

Class 49.—Baumann's Red Winter Reinette.

1. F. S. W. Cornwallis, Esq., Maidstone (gr. J. McKenzie).
2. Captain Carstairs, Newbury (gr. C. Ross).
3. Viscountess Portman, Uckfield (gr. H. C. Prinsep).

Class 50.—Blenheim Orange.

1. Hon. F. W. Buxton, Sawbridgeworth.
2. Mr. G. Chambers, Mereworth.
3. J. Colman, Gatton (gr. W. King).

Class 51.—Brownlees' Russet.

1. Roger Leigh, Esq., Maidstone.
2. Viscountess Portman, Uckfield.
3. Dowager Lady Freake, Twickenham.

Class 52.—Claygate Pearmain.

1. Roger Leigh, Esq., Maidstone.
2. Viscountess Portman, Uckfield.
3. Hon. F. W. Buxton, Sawbridgeworth.

Class 53.—Court Pendu Plat.

1. E. Dresden, Esq., Bury St. Edmunds (gr. J. C. Tallack).
2. Captain Carstairs Newbury.
3. F. M. Loneragan, Esq., Reading.

Class 54.—Cox's Orange Pippin.

1. C. H. Berners, Esq., Ipswich.
2. J. Colman, Esq., Gatton.
3. Roger Leigh, Esq., Maidstone.

Class 55.—Egremont Russet.

1. T. W. Startup, Esq., West Farleigh, Kent.
2. Sir E. G. Loder, Bart., Horsham.

Class 56.—Fearn's Pippin.

1. E. Dresden, Esq., Bury St. Edmunds.
2. F. S. W. Cornwallis, Esq., Linton, Kent.
3. G. R. Brougham, Esq., Carshalton.

Class 57.—Gascoyne's Scarlet.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Leopold de Rothschild, Esq., Acton (gr. J. Hudson).
3. Roger Leigh, Esq., Maidstone.

Class 58.—King of the Pippins.

1. E. Dresden, Esq., Bury St. Edmunds.
2. Colonel E. Brymer, M.P., Dorchester.
3. C. Lee Campbell, Esq., Ross.

Class 59.—King of Tomkins County.

1. J. Hargreaves, Esq., Reading.
2. E. Dresden, Esq., Bury St. Edmunds.
3. C. R. W. Adeane, Esq., Cambridge.

Class 60.—Mabbot's Pearmain.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Viscountess Portman, Uckfield.

Class 61.—Mannington's Pearmain.

1. Roger Leigh, Esq., Maidstone.
2. F. S. W. Cornwallis, Esq., Maidstone.
3. J. Hargreaves, Esq., Reading.

Class 62.—Margil.

1. Roger Leigh, Esq., Maidstone.
2. F. S. W. Cornwallis, Esq., Maidstone.
3. C. Lee Campbell, Esq., Ross.

Class 63.—Mother (American).

1. C. Lee Campbell, Esq., Ross.
2. F. S. W. Cornwallis, Esq., Maidstone.
3. Sir E. G. Loder, Bart., Horsham.

Class 64.—Ribston Pippin.

1. Roger Leigh, Esq., Maidstone.
2. F. S. W. Cornwallis, Esq., Maidstone.
3. C. Lee Campbell, Esq., Ross.

Class 65.—Scarlet Nonpareil.

1. Leopold de Rothschild, Esq., Acton.
2. Captain Carstairs, Newbury.
3. C. R. W. Adeane, Esq., Cambridge.

Class 66.—Sturmer Pippin.

1. J. K. D. W. Digby, Esq., Sherborne.
2. F. M. Lonergan, Esq., Reading.
3. Captain Carstairs, Newbury.

Class 67.—William's Favourite.

3. Colonel E. Brymer, M.P., Dorchester

Class 68.—Worcester Pearmain.

1. J. Colman, Esq., Gatton.
2. Roger Leigh, Esq., Maidstone.
3. C. H. Berners Esq., Ipswich.

Class 69.—Any other variety of Eating Apple.

1. F. S. W. Cornwallis, Esq., Maidstone, with 'St. Edmunds Pippin.'
2. Sir E. G. Loder, Bart., Horsham, with 'Gravenstein.'
3. Roger Leigh, Esq., Maidstone, with 'Washington.'

Class 70.—Alfriston.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Roger Leigh, Esq., Maidstone.
3. T. Oliverson, Esq., East Sutton.

Class 71.—Beauty of Kent.

1. F. M. Loneragan, Esq., Reading.
2. Roger Leigh, Esq., Maidstone.
3. Rev. A. O. Powels, Weybridge.

Class 72.—Beauty of Stoke. No awards.

Class 73.—Bismarck.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Roger Leigh, Esq., Maidstone.
3. Capt. Carstairs, Newbury.

Class 74.—Bramley's Seedling.

1. C. Lee Campbell, Esq., Ross.
2. J. H. Salmon, Esq., Chester (gr. S. Lyon).
3. C. R. W. Adeane, Esq., Cambridge.

Class 75.—Cellini.

1. Sir E. G. Loder, Bart., Horsham.
2. C. Lee Campbell, Esq., Ross.
3. Col. E. Brymer, M.P., Dorchester.

Class 76.—Cox's Pomona.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Col. E. Brymer, M.P., Dorchester.
3. Sir E. G. Loder, Bart., Horsham.

Class 77.—Duchess of Oldenburg.

1. Mr. J. Culton, Castle Douglas, N.B.
2. J. T. Charlesworth, Esq., Nutfield.
3. Sir E. G. Loder, Bart., Horsham.

Class **78**.—Dumelow's Seedling, *syn.* Wellington and Normanton Wonder.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. J. K. D. W. Digby, Esq., Sherborne.
3. C. Lee Campbell, Esq., Ross.

Class **79**.—Ecklinville Seedling.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Mr. J. Spottiswood, Brighton.
3. Roger Leigh, Esq., Maidstone.

Class **80**.—Emperor Alexander.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Roger Leigh, Esq., Maidstone.
3. Sir E. G. Loder, Bart., Horsham.

Class **81**.—Frogmore Prolific.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. C. Lee Campbell, Esq., Ross.
3. J. K. D. W. Digby, Esq., Sherborne.

Class **82**.—Golden Noble.

1. G. Chambers, Esq., Mereworth.
2. Roger Leigh, Esq., Maidstone.
3. F. S. W. Cornwallis, Esq., Maidstone.

Class **83**.—Golden Spire.

1. Roger Leigh, Esq., Maidstone.
2. Sir E. G. Loder, Bart., Horsham.
3. T. Oliverson, Esq., East Sutton.

Class **84**.—Grenadier.

1. Hon. G. M. Fortescue, Maidenhead.
2. T. Oliverson, Esq., East Sutton.
3. C. R. W. Adeane, Esq., Cambridge.

Class **85**.—Hawthornden (New).

1. Roger Leigh, Esq., Maidstone.
2. Mr. A. Brook, Mereworth.
- J. T. Charlesworth, Esq., Nutfield.

Class **86**.—Hormead Pearmain.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. C. R. W. Adeane, Esq., Cambridge.

Class **87**.—Lane's Prince Albert.

1. Capt. Carstairs, Newbury.
2. C. Lee Campbell, Ross.
3. Roger Leigh, Esq., Maidstone.

Class 88.—Lord Derby.

1. Rev. O. L. Powels, Weybridge.
2. W. N. Cazalet, Esq., Tonbridge.
3. G. H. Field, Esq., Sevenoaks.

Class 89.—Lord Grosvenor.

1. Roger Leigh, Esq., Maidstone.
2. Hon. G. M. Fortescue, Maidenhead.
3. Lady Henry Somerset, Ledbury.

Class 90.—Lord Suffield.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Roger Leigh, Esq., Maidstone.
3. F. M. Lonergan, Reading.

Class 91.—Mère de Menage.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Capt. Carstairs, Newbury.
3. Roger Leigh, Esq., Maidstone.

Class 92.—New Northern Greening.

1. Capt. Carstairs, Newbury.
2. Mr. A. Brook, Mereworth.

Class 93.—Newton Wonder (Northern Counties).

First Prize, £1 ; Second, 10s. ; presented by Messrs. J. R. Pearson & Sons, Chilwell, Notts.

1. C. R. W. Adeane, Esq., Cambridge.
2. H. H. Hurnard, Esq., Attleboro' (gr. J. Bowery).

Class 94.—Newton Wonder (Southern Counties).

First Prize, £1 ; Second, 10s. ; Third, 5s. ; presented by Messrs. J. R. Pearson & Sons, Chilwell, Notts.

1. G. H. Field, Esq., Sevenoaks.
2. Sir E. G. Loder, Bart., Horsham.
3. Philip Crowley, Esq., Croydon.

Class 95.—Peasgood's Nonesuch.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Bishop of Bath and Wells, Wells.
3. Horticultural College, Swanley.

Class 96.—Pott's Seedling.

1. J. Hargreaves, Esq., Reading.
2. Roger Leigh, Esq., Maidstone.
3. Leopold de Rothschild, Esq., Acton.

Class 97.—Royal Jubilee.

1. Captain Carstairs, Newbury.

Class 98.—Sandringham.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Earl Percy, Brentford.
3. Captain Carstairs, Newbury.

Class 99.—Seaton House. No award.**Class 100.**—Spencer's Favourite.

1. Roger Leigh, Esq., Maidstone.
2. G. R. Brougham, Esq., Carshalton.
3. T. W. Startup, Esq., Maidstone.

Class 101.—Stirling Castle.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Right Hon. W. H. Long, M.P., Trowbridge.
3. J. Colman, Esq., Gatton.

Class 102.—Stone's (*syn.* Loddington Seedling).

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Roger Leigh, Esq., Maidstone.
3. Mr. A. Brook, Mereworth.

Class 103.—The Queen.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Roger Leigh, Esq., Maidstone.
3. Hon. G. M. Fortescue, Maidenhead.

Class 104.—Tower of Glamis.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Mr. A. Brook, Mereworth.
3. C. Lee Campbell, Esq., Ross.

Class 105.—Tyler's Kernel.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. C. R. W. Adeane, Esq., Cambridge.
3. Rev. O. L. Powels, Weybridge.

Class 106.—Warner's King.

1. F. S. W. Cornwallis, Esq., Maidstone.
2. Mr. G. Chambers, Mereworth.
3. Roger Leigh, Esq., Maidstone.

Class 107.—Any other variety of Cooking Apple.

1. F. S. W. Cornwallis, Esq., Maidstone, with 'Dutch Codlin.'

2. Duchess of Cleveland, Battle (gr. W. Camm), with 'Lady Henniker.'
3. W. M. Cazalet, Esq., Tonbridge, with 'Castle Major.'

Class 108.—Bergamotte Esperen.

1. Colonel E. Brymer, M.P., Dorchester.
2. Captain Carstairs, Newbury.
3. Roger Leigh, Esq., Maidstone.

Class 109.—Beurré Bosc.

1. Sir E. G. Loder, Bart., Horsham.
2. Sir William N. Geary, Bart., Tonbridge.
3. Rev. H. Golding Palmer, Reading.

Class 110.—Beurré d'Anjou.

1. Roger Leigh, Esq., Maidstone.

Class 111.—Beurré Diel.

1. Roger Leigh, Esq., Maidstone.
2. Earl Percy, Brentford.
3. Sir E. G. Loder, Bart., Horsham.

Class 112.—Beurré Dumont.

1. Roger Leigh, Esq., Maidstone.

Class 113.—Beurré Hardy.

1. Roger Leigh, Esq., Maidstone.
2. Viscountess Portman, Uckfield.
3. C. H. Berners, Esq., Ipswich.

Class 114.—Beurré Superfin.

1. Roger Leigh, Esq., Maidstone.
2. Sir E. G. Loder, Bart., Horsham.
3. H. Padwick, Esq., Horsham.

Class 115.—Bon Chrétien (Williams').

1. Earl of Galloway, Garliestown, N.B.

Class 116.—Comte du Lamy.

1. J. Hargreaves, Esq., Reading.
2. J. T. Charlesworth, Esq., Nutfield.
3. Sir E. G. Loder, Bart., Horsham.

Class 117.—Conference.

1. Roger Leigh, Esq., Maidstone.
2. Mrs. Crawford, Gatton.
3. Colonel E. Brymer, M.P., Dorchester.

Class 118.—Conseiller (or Maréchal) de la Cour.

1. E. Dresden, Esq., Bury St. Edmunds.
2. Rev. O. L. Powels, Weybridge.
3. C. Lee Campbell, Esq., Ross.

Class 119.—Doyenné du Comice.

1. Colonel E. Brymer, M.P., Dorchester.
2. Colonel Archer-Houblon, Bishop Stortford (gr. B. Calvert).
3. Roger Leigh, Esq., Maidstone.

Class 120.—Duchesse de Bordeaux.

1. Sir E. G. Loder, Bart., Horsham.
2. Roger Leigh, Esq., Maidstone.

Class 121.—Durondeau.

1. Roger Leigh, Esq., Maidstone.
2. J. K. D. W. Digby, Esq., Sherborne.
3. Sir William N. Geary, Bart., Tonbridge.

Class 122.—Easter Beurré.

1. Col. Archer-Houblon, Saffron Walden.
2. Roger Leigh, Esq., Maidstone.
3. Col. E. Brymer, M.P., Dorchester.

Class 123.—Emile d'Heyst.

1. Roger Leigh, Esq., Maidstone.
2. Right Hon. W. H. Long, M.P., Trowbridge.
3. Sir E. G. Loder, Bart., Horsham.

Class 124.—Fondante d'Automne.

1. Rev. O. L. Powels, Weybridge.
2. J. Hargreaves, Esq., Reading.
3. Sir E. G. Loder, Bart., Horsham.

Class 125.—Fondante de Thirriott.

1. Roger Leigh, Esq., Maidstone.
2. C. H. Berners, Esq., Ipswich.
3. J. W. Melles, Esq., Chingford (gr. J. Nicholson).

Class 126.—Glou Morceau.

1. Col. E. Brymer, M.P., Dorchester
2. Roger Leigh, Esq., Maidstone.
3. Col. Archer-Houblon, Saffron Walden.

Class 127.—Josephine de Malines.

1. Col. E. Brymer, M.P., Dorchester.
2. J. T. Charlesworth, Esq., Nutfield.
3. Col. Archer-Houblon, Saffron Walde

Class **128.**—Louise Bonne of Jersey.

1. H. F. Walker, Esq., Balcombe (gr. J. Coles).
2. C. H. Berners, Esq., Ipswich.
3. Sir E. G. Loder, Bart., Horsham.

Class **129.**—Marie Benoist.

1. Roger Leigh, Esq., Maidstone.
2. C. H. Berners, Esq., Ipswich.
3. Earl Percy, Brentford.

Class **130.**—Marie Louise.

1. Rev. H. Golding Palmer, Reading.
2. Roger Leigh, Esq., Maidstone.
3. Sir E. G. Loder, Bart., Horsham.

Class **131.**—Marie Louise d'Uccle.

1. Sir William N. Geary, Bart., Tonbridge.
2. Roger Leigh, Esq., Maidstone.
3. Sir E. G. Loder, Bart., Horsham.

Class **132.**—Marguerite Marillat. (Fig. 87.)

1. Sir E. G. Loder, Bart., Horsham.
2. G. H. Field, Esq., Sevenoaks.

Class **133.**—Nouvelle Fulvie.

1. Roger Leigh, Esq., Maidstone.
2. Sir E. G. Loder, Bart., Horsham.
3. Earl Percy, Brentford.

Class **134.**—Olivier de Serres.

1. Sir E. G. Loder, Bart., Horsham.
2. Roger Leigh, Esq., Maidstone.
3. J. W. Melles, Esq., Chingford.

Class **135.**—Pitmaston Duchess. (Fig. 88.)

1. Sir William N. Geary, Bart., Tonbridge.
2. Roger Leigh, Esq., Maidstone.
3. O. A. Smith, Esq., East Grinstead.

Class **136.**—Seckle.

1. Captain Carstairs, Newbury.
2. J. Hargreaves, Esq., Reading.
3. Lady Henry Somerset, Ledbury.

Class **137.**—Souvenir du Congrès. (Fig. 89.)

1. Sir E. G. Loder, Bart., Horsham.
2. W. N. Cazalet, Esq., Tonbridge.

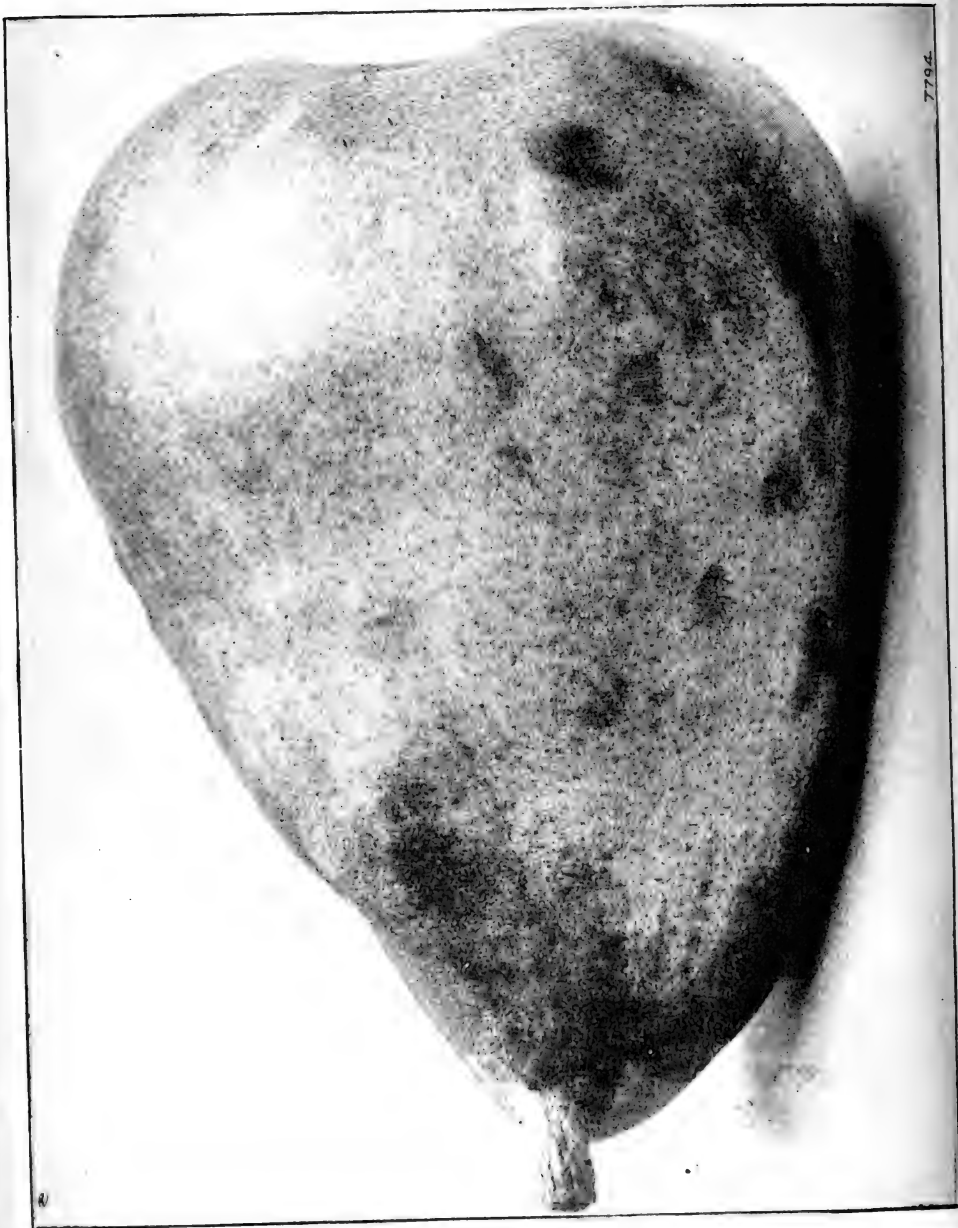


FIG. 87.—PEAR MARQUETTE MAILLAT. (*Gardener's Magazine*.)

Class 138.—Thompson's.

1. Col. E. Brymer, M.P., Dorchester,
2. Sir William N. Geary, Bart., Tonbridge.
3. Mrs. Crawford, Gatton.

Class 139.—Triomphe de Vienne.

No awards.

Class 140.—Winter Nelis.

1. Roger Leigh, Esq., Maidstone.
2. Sir E. G. Loder, Bart., Horsham.
3. Lady Henry Somerset, Ledbury.

Class 141.—Any other variety.

1. Roger Leigh, Esq., Maidstone, with 'Gansel's Bergamot.'
2. Mr. J. Spottiswood, Brighton, with 'Duchesse d'Angoulême.'
3. Sir E. G. Loder, Bart., Horsham, with 'Princess.'

DIVISION V.

The Veitch Prizes for Flavour.

Open to Amateurs and Gentlemen's Gardeners only.

Class 142.—The best flavoured Apple.

First Prize, 10s. ; Second, 5s.

1. Viscountess Portman, Uckfield, with 'Ripston Pippin.'
2. Hon. G. M. Fortescue, Maidenhead, with 'Cox's Orange.'

Class 143.—The best flavoured Pear.

First Prize, 10s. ; Second, 5s.

1. Rev. H. Golding Palmer, Reading, with 'Louise Bonne.'
 2. Sir William N. Geary, Bart., Tonbridge, with 'Fondante d'Automne.'
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FIG. 88. — PEAR PUTNAMTON DUCHESNE. (*Cardener's Magazine*.)

JUDGES.

The following gentlemen kindly acted as judges, and deserve the best thanks of the Society for their really arduous labours, viz.—

Mr. H. Balderson
 Mr. A. F. Barron, V.M.H.
 Mr. W. Bates
 Mr. E. Beckett
 Mr. G. Bunyard, V.M.H.
 Mr. J. Cheal
 Mr. W. Crump, V.M.H.
 Mr. A. Dean
 Mr. C. Herrin
 Mr. J. Hudson, V.M.H.
 Mr. W. Jarman

Mr. H. Markham
 Mr. J. McIndoe, V.M.H.
 Mr. G. Norman
 Mr. A. H. Pearson
 Mr. W. Pope
 Mr. T. F. Rivers, V.M.H.
 Mr. J. Smith, V.M.H.
 Mr. O. Thomas, V.M.H.
 Mr. J. Walker
 Mr. J. Wright, V.M.H.
 Mr. G. Wythes, V.M.H.

MISCELLANEOUS EXHIBITS.

Her Majesty the Queen (gr. Mr. Owen Thomas, V.M.H.) sent a magnificent collection of Apples, Pears, Grapes, Pines, and Tomatos. (Fig. 90.)

From the Society's Gardens (Superintendent, Mr. S. T. Wright) came a very interesting collection of 54 varieties of more or less known Pears and 16 varieties of Grapes.

Messrs. James Veitch, of Chelsea, sent a very large collection of Apples and Pears.

Messrs. Laing, of Forest Hill, sent a fine collection of Apples and Pears.

Messrs. Sutton, of Reading, sent a brightly coloured exhibit of Tomatos in thirteen large baskets.

Messrs. Cheal, of Crawley, sent a beautiful exhibit of Apples and Pears.

Messrs. Fisher, Son & Sibray, of Sheffield, sent 85 varieties of Apples and Pears, together with some pretty little specimen-trained trees.

Messrs. Peed, of West Norwood, sent a large collection of Apples and Pears, and some good Grapes.

Messrs. Spooner, of Hounslow, sent a fine collection of Apples and Pears.

Mr. B. Wells, Crawley, sent some Apples.

Mr. Horne, of Cliffe, sent Apples.

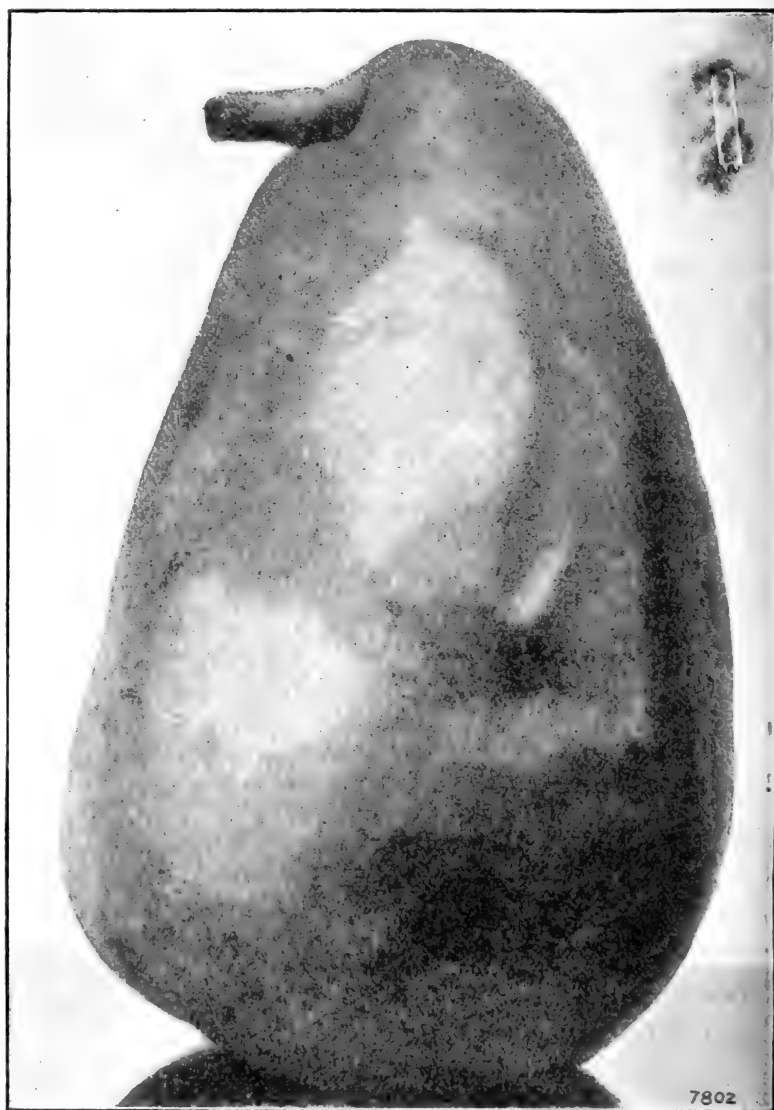


FIG. 89.—PEAR SOUVENIR DU CONGRÈS. (*Gardeners' Magazine*.)

The Horticultural College, Swanley (Principal, F. G. Powell, Esq.), sent Apples and Pears, together with excellent-looking specimens of Fruits bottled at the College.

Messrs. Gaymer, Attleborough, sent specimens of a multitude of cider Apples and their produce.

Messrs. Paul, of Cheshunt, sent some nice Apples.

Several nurserymen sent exhibits of Flowers.

CONFERENCE.

THURSDAY, SEPTEMBER 30.

The Chair was taken by Sir Trevor Lawrence, Bart., President of the Society, at 3 P.M., who called on Mr. George Bunyard, V.M.H., of Maidstone, who read the following paper :—

PROGRESS IN FRUIT CULTURE DURING QUEEN VICTORIA'S REIGN, 1837-1897.

By MR. GEORGE BUNYARD, V.M.H.

It is somewhat difficult to carry back one's mind to the condition of fruit culture that existed sixty years ago, and I propose, therefore, to ask you in imagination to pay a visit to a well-kept garden of 1837, to inspect the style of culture then in use, and to take note of the varieties of fruit which were cultivated in it.

We will suppose that the garden is a large square walled-in area of two or three acres. On the outside the line of wall facing south would be broken by a plain building in the centre, lofty inside, with massive pillars, and windows reaching to the ground, not heated, as nowadays, but capable of resisting a fair amount of frost.

In this building one would find large Orange and Lemon trees in tubs, the earlier introduced varieties of Camellias (probably from Chandler's at Vauxhall), some Oleanders, large trees of *Aloysia citriodora* (the Lemon plant), Pomegranates, Fuchsias, and possibly a number of Bay trees, and other shrubs, which in summer time would be placed out on the terraces.

The outside walls, right and left, would be clothed with



FIG. 90.—EXHIBITED BY H.M. THE QUEEN. (*Gardeners' Magazine.*)

Magnolias, interspersed with hardy Vines, trained uprightly, and with Roses of the Ayrshire type, an opening in the wall revealing a gateway leading to the kitchen-garden.

The north side would probably be at the back of the stables, and leading from them directly through the centre would be a 12 ft. road, equally dividing the garden, for the purpose of getting in manure, clearing away rubbish, and other purposes. This central alley would be bordered on each side with ancient Pears and Apples, trained in the basin form, of a rigidly uniform pattern, furnished with a vast quantity of twiggy spurs bearing a sprinkling of fruit—in fact, more for ornament than use. The Apples might be represented by such old favourites as—

Alfriston.	Golden Reinette.	Manks Nonpareil.
Blenheim Orange.	Gooseberry.	Northern Greening.
Court of Wick.	Golden Harvey.	Norfolk Beaufin.
Court Pendu Plat.	Hawthornden.	Old Nonpareil.
Devon Quarrenden.	Joaneting.	Scarlet Nonpareil.
Downton Pippin.	Keswick Codlin.	White Paradise.
Dutch Codlin.	Kerry Pippin.	Wellington.
French Crab.	Lemon Pippin.	Winter Quoining.

And the Pears by—

Aston Town.	Catillac or Pound Pear.	Swan's Egg.
Althorp Crasanne.	Chaumontel.	St. Germain.
Autumn Bergamot.	Citron des Carmes.	Vicar of Winkfield.
Beurré Diel.	Dunmore (Knight's).	Windsor.
Brown Beurré.	Easter Beurré.	Winter Crasanne.
Bishop's Thumb.	Nec Plus Meuris.	Williams' Bon Chrétien.
Colmar (green).		

And in the North of England by—

Green Yair.	Beurré Gris.	Muirfowl's Egg, &c.
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We will suppose a sloping border 18 feet wide to run entirely round the garden in front of the walls, bordered by a 6-foot path, and there will be either square quarters bordered by Espalier trees, or wedge-shaped beds converging in the centre towards a large circular water-tank, with York stone border, having flights of steps for the men to dip their water-cans. This tank would have a few gold fish in it, besides Water Lilies, Flags, and Bullrushes.

The wall facing south would be planted with Peaches and Nectarines, interspersed with hardy Grapes; while Apricots would occupy the western side. The Peaches would probably consist of—

Acton Scot.	Early Admirable.	Noblesse.
Catherine.	Late Admirable.	Newington.
Early Anne.	Malta.	Royal George.

And selections from—

Avant.	Incomparable.	Nutmeg.
Chancellor.	Montauban.	Pavie Royale, &c.
Double Montagne.		

The Nectarines might perhaps be selected from—

Brugnon.	Murrey.	Temple.
Clermont.	Newington.	Violette Hâtive.
Elruge.	Red Roman.	White.
Hunt's Tawny.	Scarlet.	

The Apricots might probably consist of—

Breda.	Orange.	Turkey.
Brussels.	Roman.	

The Vines would be Black and White Sweetwater, Black Cluster, White Muscadine, and perhaps a few Continental novelties on trial, such as D'Arboyce, Rhenish, Lombardy, and others now unknown.

On the east and west walls we should find Pears, mingled with Plums. The latter would very probably be the successors of a yet more ancient race of Pears, which had given out from old age. These wall Pears would be enormous horizontal and formally trained trees, interspersed with fan-trained examples; Jargonelle, bearing a healthy lot of leaves, with a few large fruits on the tips of the branches; Chaumontel, of which the only healthy portion (the top line of boughs) would carry a few large Pears; Passe Colmar, a faggot of spurs and leaves, bearing a crop every other year; Gansel's Bergamot in a worse plight than the Chaumontel, cankered and grievous, but grown because the owner has a fancy for a dish or two in the pheasant season; Windsor, like an Elm for robust growth, giving a few enormous and brilliantly coloured fruits, a special food for the wasps and bees; the then new Glou Morceau and Marie Louise would be fine young trees bearing a lot of good fruit, though perhaps too thickly set with lateral boughs; besides Gratioli of Jersey, Louise Bonne, Duchesse d'Angoulême, March Bergamot, Beurré Diel, then of the first rank, with Nec Plus Meuris for a late sort, and Catillac for stewing.

On the east and west walls Amber Bigarreau, May Duke, and Waterloo Cherries would also be trained, and possibly Black Tartarian, Late Duke, Black Heart, Bleeding Heart, and Florence. A few of the choicest Dessert Apples, as Ribston, Old

and Scarlet Nonpareils, Margil, &c., would be placed on the west walls ; a position, by the way, which might sometimes even now be given them with advantage.

The Plums on east and west walls would consist of—

Coe's Golden Drop	Old and New Orleans	Red and White Mag-
Coe's Late Red	Prince of Wales	num
Goliath	Purple Impératrice	Washington
Green Gage	Perdrigon	

with Victoria, then called "Royal Dauphin," as a recent variety ; and if in Kent, possibly the Diamond and Kirke's Blue.

The back of the stables (facing north) would have large rider trained Pear trees, the Beurré Kirke, with Knight's introductions, Dunmore, Monarch, and Rouse Lençh ; and late Plums like Coe's Late Red and Impératrice.

On the north wall we should only find Morello Cherries, with upright trained Gooseberries* and Currants for a late crop.

The Espaliers flanking the paths would mainly be Dessert Apples, including those before named, with—

Beauty of Kent.	Hollandbury.	Pearson's Plate.
Colonel Vaughan.	King of Pippins.	Polinia Pearmain.
Fearn's Pippin.	Loan's Pearmain.	Royal Pearmain.
Golden Pippins (sorts).	Nonesuch (old).	Ribston Pippin.
Hanwell Souring.	Margil.	Red Astrachan.
Hoary Morning.	Old Dutch Codlin.	Ross Nonpareil.

All would be of great age, with perfect bundles of spurs on their old arms, carefully and hardly pruned as to their branches, but with roots which had never been disturbed from the day they were planted, probably more than half a century before.

It may be remarked that in those days Dessert Apples were much smaller than they are now.

In the south-west corner we should find Brunswick and White Marseilles Figs, with large limbs rising from a stool perhaps a hundred years old.

In no class of fruit has greater progress been made than in the Strawberry. Previous to 1837 Black Prince, Keen's Seedling (1821), and Carolina were the only good varieties ; and the gardens of the period were filled with such forgotten families as Carmines, Hudson's Bay, Scarlets of several varieties, Rose-

* Cordon Gooseberries are mentioned in the *Florist* for 1840.

berry, Cones of all sorts, Glazed Pine, Bostock, Chili, and a great number of the Hautbois and Alpine varieties.

British Queen was in commerce in 1840, and President about 1850. The 1842 catalogue of the Royal Horticultural Society gives a list of twenty-six useful varieties and about 300 others of no value, or synonymous. These were divided into classes by Mr. Robert Thompson, the Curator, viz.—Class 1, Scarlets; 2, Blacks; 3, Pines; 4, Chili; 5, Hautbois; 6, Green; 7, Alpine.

So much for the autumn aspect of the garden. We must, however, in justice to our forefathers, say that they took intense pains and trouble to train their trees: the Peaches, Nectarines, and Apricots were taken away from the walls annually; the walls washed with a dressing of soot, lime, and sulphur, with soft soap and clay; while the gathered-up boughs, carefully secured to poles away from the wall, would be cleansed by the snows and rains of winter and the free current of air. After Christmas they would be carefully looked over and pruned; each bough and twig correctly trained, by a plumb line tied to the main trunk, would be replaced on the wall with geometrical precision. Such care would be followed by a timely finger-and-thumb practice on the fore-right shoots in April. It being considered sacrilege to “knife” Peaches, in the early summer, a few leaves would be taken away to assist the fruit to colour. Later on a careful thinning of the fruit, judicious laying in of the finer shoots, and the removal of wood that had fruited would ensure a crop for the following season.

Such care is seldom exercised, we fear, on wall fruit in these days, the gardener depending more on his crops from heated and cool glass-houses.

About this time Messrs. R. Thompson, at the Society's Gardens; Ronalds, of Brentford; Wilmot & Chaundy, of Lewisham; Thomas Rivers, of Sawbridgeworth; Osborn, of Fulham; Lee, of Hammersmith; Pearson, of Chilwell; and Chandler, of Vauxhall, were the giants in fruit-tree culture. Probably also our landed gentry had more frequent intercourse with the Continent, which led to an awakened interest in fruit growing; and from what we can learn and have observed, any fruit with a French name was then thought to be worthy of culture, and Britain was flooded with varieties which time and experience have proved to be worthless for our climate. In fact

many were but perry and cider fruits, and probably the Continental stocks as well as most of our British ones were then far from correct to name. Still *some* good Continental fruits were introduced, and are standard varieties at this day. But no doubt the national dislike to anything foreign operated in some degree against their general adoption in the provinces.

Meanwhile new methods had appeared on the scene. The introduction of glasshouses heated by hot water and the removal of the duty on window-glass at once gave an impetus to fruit culture. At first Grapes felt the benefit of the change, and later on Peaches and Nectarines; but when our great practical father of garden fruit culture, Mr. Thomas Rivers, of Sawbridge-worth, adopted the Continental practice of using the Quince stock for Pears, and the Paradise stock for Apples, the old saying, "plant Pears for your heirs," was exploded; and the marvellous little pyramidal trees a yard high, producing fruit in abundance, and Bush Apples with a crop that would weigh down the trees themselves, at once became the rage.

These fancy trees, combined with Mr. Rivers' practical little work on "Root Pruning and Summer Pinching," laid the foundation of that marvellous culture of garden fruit which has placed our British produce in the foremost position, whether for size, beauty, flavour, or quality; and has by degrees made what were the luxuries of the few in the past the inheritance of all classes; for example, good Grapes, once 25s. or 30s. per lb., can now be had from a shilling to half-a-crown.

The duty was taken off glass in 1845. Timber duties were modified in 1830. The practical application of hot water for heating purposes dates from 1821. Mr. Edward Weeks, of Chelsea, introduced his tubular saddle boiler in 1835, and Mr. John Weeks improved on this by constructing his upright tubular boiler in 1839.

Another factor has been the use of steam saws and planes for cutting out and shaping suitable timber for rafters, sashes, &c., and naturally the use of railways, steamships, and canals for the conveyance of foreign glass and timber. In fact, it is now reported that one firm of brothers in the market trade have, at the present time, as many as 134 acres of glasshouses.

Later on the introduction of the so-called glass-covered walls and orchard houses created a further stimulus, in which choice

fruits could be grown to perfection, either planted out or in pots. Orchard houses are noted in the *Florist* for 1854, and proved to be a boon to many who lived in unfavourable climates, or had no walled gardens, and to Mr. Thos. Rivers again we owe the introduction of this special mode of culture.

At this time also the Continental Pyramidal, Cordon, Bush, and fancy trained trees on the French system came into vogue, and still further advanced our culture and enabled growers to prove new sorts quickly; as when planted on restricting stocks (the Quince and the Paradise) it is not unusual to get fruit on one and two year old trees.

It should be mentioned, however, that the new system fell into discredit owing to the sale of Apples on Crab, and Pears on free Pear stocks; which, while preserving the pyramidal form and making fine, shapely trees, yet, so to speak, missed the spirit of the subject, and, becoming infertile and rampant in growth, cast discredit on the new style of culture for a time; but this has now been corrected.

Nowadays every good gardener has added to the regular garden routine, root pruning of all fruit trees that grow so rapidly as to become void of fruit buds. This practice has perhaps more than any other helped on the culture of garden fruits; and by maintaining a proper balance between the anchor roots, which develop the woody growth, and the upper or fibrous roots, which are supposed to nourish the fruit, has thereby ensured success, should the English spring weather prove favourable.

There is no doubt that root pruning, combined with the summer mulching and feeding of those trees that are carrying heavy crops, embodies the most conspicuous advance in fruit culture of the Victorian period.

It may be remarked here that the increase in size of Exhibition Apples and Pears has been wonderful; even those figured so recently as 1885 in the "Herefordshire Pomona" are now exhibited nearly double the size.

A large share of the present practical store of knowledge we possess as to varieties, culture, and novelties must be justly said to be due to the energy and painstaking reports of the horticultural press of the past fifty years, not forgetting the publications of the Royal Horticultural Society and its valuable work at

Chiswick, where so many unknown fruits have been grown, tried, and reported on.

The old Chiswick collections were brought together by the energy and knowledge of our late father in pomology, Dr. Robert Hogg, and were with great labour classified and reported on by Robert Thompson, the Superintendent of the Society's Gardens, whose "Catalogue of Fruits" (1842) and the "Supplement" (1853) remained the text-books on the subject until Dr. Hogg brought out his "Fruit Manual" in 1866.

Among the most valuable of the Royal Horticultural Society's many-sided work is the awarding of certificates to fruits, thus stamping them with its authority, and helping to bring to notice many unknown and valuable varieties. On referring to the published list of awards to fruits it will be found that (excluding Melons) no less than 224 first-class certificates and awards of merit have been given to new fruits (1837-97); and it may interest those who question the value of the work done by the Society's committees to say that, out of the 224 certificates granted, only about fifty varieties have gone out of commerce, and that through being superseded by better ones. At the same time it should be remembered that even these superseded awards were in many cases but the encouraging steps that led to the further improvements. It would be well if, as individuals, we all made as few errors of judgment.

In the pomological literature of the period the first place must be given to the late Dr. Robert Hogg, whose "Fruit Manual" has become a standard book of reference for all British and even American fruit growers. The work of Robert Thompson, of Chiswick, before quoted; the publication of Mr. John Wright's essay for the Fruiterers' Company; Mr. Pearson's "Hardy Fruits for the Midlands"; Mr. Cheal's "Practical Fruit Culture"; and, if it be permitted to mention one's own efforts, my "Fruit Farming for Profit," and many other books have also supplied valuable information in a popular form. In the earlier period the "Transactions of the Pomological Society" (established 1854); the Journals of the Royal Horticultural Society in recent times, with the Reports of the Chiswick Apple and Pear Conferences, 1883, 1885, 1888; and Mr. Malcolm Dunn's Report on the Edinburgh Plum Conference, 1889, supply practical hints for planters in all districts. "Scott's Orchardist,"

1865, gives a vast bulk of information; and the finest illustrated work is undoubtedly Dr. Bull's "Herefordshire Pomona," an *édition de luxe* in every respect, followed quite recently by the "Fruit Growers' Guide," by Mr. John Wright, with illustrations by Miss Rivers.

Although published a few years before the date of the Queen's accession I should like to draw attention to that grand work of Hugh Ronalds, which for the period of its publication was a very remarkable undertaking, the exquisite drawings from nature on stone being done by Miss Ronalds. I allude to "*Pyrus Malus Brentfordiensis*," London, 1831, which describes and illustrates about 200 Apples, the best then known in the celebrated Brentford Nurseries.

I need not here detain you by giving a long list of the varieties introduced—1837 to 1897—but I have prepared some lists of them, which appear in Appendix B, in which will be found all the notable varieties, with the dates of their introduction or certificate. In preparing this list great difficulty has been experienced, as no particular record appears to exist, and I have therefore placed a "c" (for *circa*) before those not actually dated in print; and it is interesting to note that at the present time a new variety of fruit may be certificated in one year and sent out the next. The spread of horticultural literature and commercial energy would account for this. The Ecklinville Apple, known in Ireland in 1800, was not much in commerce till the late Mr. Dancer, of Chiswick, brought it to notice about 1860, and Cox's Orange Pippin was some twenty-five years before it became generally known.

In passing, I must allude to those super-excellent varieties which have come to the front, and which have, I believe, as the Americans say, "come to stay." A list of them will be found in Appendix C.

I consider that the greatest direct benefit to fruit culture, so far as the Apple is concerned, was derived from the 1883 Conference held at Chiswick by the Royal Horticultural Society. This not only brought some fine but little known varieties into prominence, but, what is of more importance, a tabulated list of synonymous names was made, and wholesale errors in naming were corrected. Followed as the Apple Conference was by the Pear Conference and the Small Fruits Conference, and by various

papers read at the meetings, the 1883 Conference served as a landmark and starting-point for much good work in London and the provinces. The great Guildhall Show of the Fruiterers' Company, held as it was in the heart of the City, served to convince Londoners that grand fruit was and could be grown in this country. The great fruit Shows formerly held by the Crystal Palace Company accurately gauged the rate of progress, and the Royal Horticultural Society, having taken over these Shows, have in 1894, 1895, 1896, and 1897 brought together such collections of autumnal fruits as have never before been seen. It is satisfactory to find new exhibitors coming to the front yearly from all parts of the kingdom. Fruit Conferences have also been held at Chester, Pershore, Worcester, Exeter, and other centres.

It would be out of place here to allude to the enormous increase in the growth of fruit for market purposes and for preserving; but I mention it only to impress the fact that success can be secured only by following the principles and practice of horticulture; in short, bringing gardening methods to bear on farm fruit culture. The annual tables of the Board of Trade show an enormous yearly increase in land laid down to fruit, and where this is well done it becomes a paying industry.

Considerable importance also attaches to the commercial activity of the fruit-tree nurserymen of the present and past times. The desire to excel in friendly competition in fruit exhibitions, the placing before the public examples grown with skill and care, the introduction of novelties, and the carefully prepared catalogues of the trade have, I believe, been beneficial factors in the general advance made in fruit culture, tending to popularise the growth of all kinds for pleasure, profit, or, as a hobby, to the enormous advantage of the public in the matter of health and sobriety. In fact, I would go even further, feeling convinced in this particular matter that a great measure of the improved health of the large towns is to be traced to the cheap supplies of fruit and vegetables placed within their reach by the commercial energy of the growers and distributors; and still further benefit is to be expected in the future as a result of the practical lectures now being given by County Council experts in fruit districts among the intelligent labouring classes.

Among the practical gardeners of the early years of the era

special mention should be made of Messrs. T. Jones & Ingram, of the Frogmore Gardens; the then gardener at Deepdene; J. Woodbridge, of Syon; Chas. Ross, of Welford Park; Cox, of Redleaf; Frost, of Dropmore; Fleming, of Trentham; Ingram, of Belvoir; Speed, of Chatsworth; Ford, of Leonardslee; Don, of Bedgbury; Luckhurst, of Maidstone; Wildsmith, of Heckfield; and others now passed away. The forerunner in modern culture was probably Sir Henry Scudamore Stanhope, of Holme Lacey, Hereford. In later times Mr. R. D. Blackmore, of Teddington, has been the pioneer in testing the newer varieties, and Dr. Hogg's "Fruit Manual" owes no small part of its value to Mr. Blackmore's experience. The gardens of Barham Court, Teston, have of late supplied the champion prize hardy fruits; whilst Messrs. Goodacre, Blair, McHattie, Hunter, McIndoe, and others being the most successful in hot-house fruits.

I have now sketched in outline the "Progress in Fruit Culture" during the sixty years of Queen Victoria's reign. Much more could be added if time permitted, but I am sure you will agree that the rate of progress in horticulture has been quite as rapid and far-reaching as in many other of the industrial arts and sciences; and I look forward confidently for still greater progress in the future among the many intelligent gardeners, nurserymen, and hybridists of our time who are not slow to avail themselves of the vast opportunities that lie around them.

LIST OF FINE FRUITS IN CULTIVATION, 1837.

APPLES

Alfriston.	Gravenstein.
Astrachan, Red.	Gloria Mundi.
Beauty of Kent.	Hambledon Deux Ans.
Beachamwell.	Hanwell Souring.
Blenheim Orange.	Hoary Morning.
Codlin, Manks.	Hawthornden.
Codlin, Carlisle.	Hollandbury.
Codlin, Keswick.	Irish Peach.
Calville White.	Joaneting.
Cornish Aromatic.	Kent Fillbasket.
Court Pendu Plat.	Minchull Crab.
Court of Wick.	Margaret or Red Joaneting.
Christie's Pippin.	Margil.
Duchess of Oldenburg.	Norfolk Beaufin.
Dutch Mignonne.	Nonpareil, Braddick's.
Dutch Codlin.	Nonpareil, Ross.
Devonshire Quarrenden.	Nonpareil, Scarlet.
Emperor Alexander.	Nonesuch, Old.
Flower of Kent.	Pearmain, Hereford.

APPLES—*continued*.

Pearmain, Royal.	Pippin, Wormsley.
Pearmain, Scarlet.	Pippin, Wyken.
Pearmain, Claygate.	Pippins, King of.
Pearmain, Adams'.	Reinette du Canada.
Pippin, Cockle's.	Reinette Golden.
Pippin, Fearn's.	Rymer or Caldwell.
Pippin, Lemon.	Royal Russet.
Pippin, Kerry.	Syke House Russet.
Pippin, London.	Wellington.
Pippin, Ribston.	

Being 57 out of 250 figured in Ronald's work, 1842.

In the Catalogue of the Maidstone Nurseries, 1830, besides the above we find—

Downton Pippin.	Winter Quoining.
French Crab.	Golden Knob.

PEARS IN 1837.

Aston Town.	Jargonelle.
Autumn Bergamot.	Green Chisel.
Beurré Diel.	Green Colmar.
Black Pear of Worcester (Verulam).	Lammas.
Brown Beurré.	Marie Louise.
Chaumontel.	Uvedale's St. Germain.
Crauford or Chalks.	Summer Crasanne.
Citron des Carmes.	Swan's Egg.
Easter Beurré.	Windsor.
	Williams' Bon Chrétien.

PLUMS IN 1837.

Blue Gage.	Magnum Bonum, Red.
Coe's Golden Drop.	Magnum Bonum, White.
Green Gage.	Orleans, Old.
Goliath.	Orleans, Early.
Kirke's New Blue.	Royal Dauphin or Victoria.*
Impératrice, Blue and White.	

CHERRIES IN 1837.

Adams' Crown Heart.	Florence.
Amber Heart or Kent Bigarreau.	Flemish Red.
Black Heart.	Kentish Red.
Black Eagle.	Late Duke.
Corone (black).	May Duke.
Elton.	Waterloo.

NECTARINES.

Elruge.	Violette Hâtive.
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PEACHES.

Bellegarde.	Royal George.
Grosse Mignonne.	Violette Hâtive.
Noblesse.	

**Gardeners' Chronicle*, June 12, p. 380, says:—"The famous Victoria itself was not with us when the Queen's reign began," but it appears to have been cultivated before that date, under the synonyms of Royal Dauphin and Sharpe's Emperor.

APRICOTS.

Breda.

Moorpark.

FIGS.

Brunswick.

Ischia, White.

Marseilles, White.

STRAWBERRIES.

Carolina, the small preserving variety known as "Scarlets."

APPENDIX B.—NOTABLE FRUITS INTRODUCED
TO COMMERCE 1837 TO 1897.

† First Class Certificate R.H.S. with date of award.

* Award of Merit R.H.S. with date of award.

(The dates are given when † or * was awarded.)

APPLES.

*Albury Park Nonesuch ...	1892	Hormead Pearmain... ..c.	1885
†Allington Pippin	1894	Irish Peach	
*Armored	1890	*King Harry	1892
*Atalanta	1891	King of Tomkins County	1860
†Annie Elizabeth	1866	†Lady Henniker... ..	1873
Allen's Everlasting ... ..c.	1850	†Lady Sudeley	1884
Baumann's Reinette	1878	†Lord Burghley	1865
†Barchard's Seedling	1878	Lord Derby	1851
Belle de Pontoise	1878	*Lord Hindlip	1896
†Beauty of Stoke	1890	Lord Suffield	1837
†Beauty of Bath... ..	1887	*Lord Grosvenor ... ..c.	1875
*Bow Hill Pippin	1893	*May Queen	1892
†Bismarck	1887	Mrs. Barron	R.H.S
Boston Russet, as Roxbury	1840	†Mr. Gladstone	1883
†Bramley's Seedling	1883	Mother (of America) ... ..c.	1850
†Blue Pearmain	1893	Melon " "c.	1850
*Byford Wonder	1893	Mère de Menage	
Brownlees' Russet	1848	†Newton Wonder	1887
Cellini		†Peasgood's Nonesuch	1872
†Chelmsford Wonder... ..	1891	Pearmain Mabbott's ... ..c.	1850
Cox's Pomona	1854	Pott's Seedling... ..	1849
*Cardinal	1896	†Prince Albert (Lane's)	1881
Cox's Orange Pippin ... ..c.	1854	Queen Caroline (Brown's)	
Duchess of Oldenburg.		Rivers' Codlin	1894
Duke of Devonshire ... ..c.	1875	Rivers' Peach	1893
Early Rivers	1893	†Roundway Magnum Bonum	1864
Ecklinville Seedling, raised	1800	Royal Jubilee	1888
Egremont Russet ... ..c.	1883	†Sandringham	1883
Frogmore Prolific ... ..c.	1845	†Schoolmaster	1880
†Gascoyne's Seedling... ..	1887	†September Beauty	1885
Gold Medal ... ..c.	1888	†St. Edmund's Pippin	1875
Golden Noble to R.H.S. ...	1820	†Stone's, or Loddington	1877
†Grenadier	1883-c. 1875	Stirling Castle, raised	1830
Golden Spire ... ..c.	1875	Striped Beefing, dis.	1847
†Hambling's Seedling	1893	Seaton House ... ..c.	1860
Hawthornden, New		†The Queen	1880

APPLES—*continued*.

†Tyler's Kernel 1883	*Williams' Favourite 1895-c. 1880
Warner's King, introduced 1800	†Worcester Pearmain ... 1875
*Wealthy 1893-c. 1882	*White Transparent 1895
Washington c. 1876	Yellow Ingestrie 1848

NOTE.—The exact date of those marked "c" cannot be definitely fixed.
Any reliable information as to dates would be welcomed.

APRICOTS.

†Frogmore Early 1895	Large Early, under its
Blenheim	French name 1845

CHERRIES.

Belle d'Orléans (Continent)	†Emperor Francis 1887
1740—1864	†Frogmore Bigarreau ... 1865
Bigarreau Napoleon ...c. 1828	†Géant d'Hedelfingen ... 1896
†Early Rivers 1870	

CURRANTS.

†Black, Champion, or Baldwin's.	Red, La Versailles.
†Black, Lee's Prolific.	White Versailles.

FIGS.

†Bourjasotte Grise 1892	†Monaco Bianco... .. 1892
†Gourand Noir 1865	†Nebian 1892
†Grosse Verte 1867	†Negro Largo 1892
†Large Black Douro (Dr.	†St. John's 1890
Hogg's) 1892	†Violette Sepor 1892

GOOSEBERRIES.

Keepsake 1841	Whinham's Industry ...c. 1860
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GRAPES.

Some forty have received awards, but the following are those which have come into cultivation :—

†Alnwick Seedling 1876	Gros Colmar 1847
*Appley Towers... .. 1889	†Lady Downes, raised 1835-1862
†Black Alicante... .. 1867	†Lady Hutt... .. 1890
Buckland Sweetwater ... 1856	†Madresfield Court 1867
Duke of Buccleuch ...	Muscat Hamburgh ... ..c. 1855
†Foster's White Seedling,	†Mrs. Pince's Black Muscat 1863
raised 1835-1845	†Mrs. Pearson 1874
†Gros Maroc 1880	

NECTARINES.

†Cardinal 1896	Newton 1873
Dryden 1873	Pine Apple... .. 1867
†Early Rivers 1892	Spencer' 1873
Humboldt 1869	†Victoria 1861
†Lord Napier 1877	(All raised by Rivers.)

PEACHES.

†Alexander (Early American) 1893	Hale's Early 1877
*Amnden June do. 1892	Princess of Wales 1865
Dymond ... ..c. 1875	†Rivers' Early York 1867
Goshawk 1866	Sea Eagle 1864
†Gladstone 1869	The Nectarine Peach ... 1864
	Waterloo (American) ... 1874

PEARS.

Baronne de Mello ... 1839-1854	Fondante d'Automne ... 1828
†Belle Julie... .. 1894	Fondante de Thirriot ...c. 1890
†Beurré de Jonghe 1875	Josephine de Malines, raised 1838
*Beurré du Buisson 1894	Knight's Monarch, raised 1830
†Beurré Fouqueray 1893	†Le Lectier... .. 1894
Beurré Bosc ... ..c. 1835	Maréchal de Cour 1847
Beurré Superfin... .. 1844	Marie Benoist ... ..c. 1874
Beurré Hardy 1830	Marguerite Marillat 1856
†Beurré Perran 1896	Nouvelle Fulvie, raised 1854
†Conference 1885	Olivier des Serres, raised... 1864
†Duchesse de Bordeaux ... 1885	†Pitmaston Duchess 1874
Doyenné du Comice (Con- tinent) 1849-1852	Passe Crassanne ... ..c. 1869
Doyenné Boussoch 1842	Souvenir du Congrès... .. 1868
Durondeau (Continent) ... 1828	Thompson's 1854
Emile d'Heyst 1849	Triomphe de Vienne... .. 1876

PLUMS.

Angelina Burdett ... ..c. 1850	†Grand Duke 1880
Belgian Purple ... ..c. 1850	†Late Transparent ... 1875-1892
†Belle de Louvain ... ..c. 1855	Oulin's Golden Gage (French) 1855
Bonne Bouche 1867	†Monarch (Rivers') 1894
Bryanston Gage... ..	Pond's Seedling... ..
Denniston's Superb (Ameri- can)	Reine Claude Comte Althann
Early Prolific (Rivers'), raised 1834	†Sultan 1873
Jefferson (quoted in <i>Florist</i>) 1854	The Czar, raised 1871
†Golden Transparent ... 1893	Transparent Gage, old, or Reine Claude Diaphane
	Transparent Gage (Rivers' New Early) 1869

DAMSONS.

Frogmore Prolific (Jones)...	King of Damsons (Bradley)
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RASPBERRIES.

†Belle de Fontenay 1865	Norwich Wonder
Baumforth's Seedling ...	†Superlative 1888
Carter's Prolific ... ..c. 1850	

STRAWBERRIES.

Some 30 have received awards, but the following are those which will probably remain standard varieties:—

*Auguste Nicaise 1890	†Lord Suffield 1891
† „ Boisselot 1890	La Grosse Sucrée
British Queen 1840	†Noble... .. 1886
†Dr. Hogg 1866	President (Green's) 1867
Elton Pine	†Royal Sovereign 1892
Eleanor	†Sir Charles Napier 1867
Filbert Pine (quoted in <i>Florist</i>) 1854	Sir Joseph Paxton
†Guntton Park 1891	Trollope's Victoria ... c. 1850-7
King of Earlies 18—	†Veitch's Perfection 1896
Kitley's Goliath... ..	Vicomtesse Hericart de Thury
†Latest of All 1894	*Waterloo 1885

Advances have been made in Filberts, Pine Apples, Oranges, Blackberries, Bananas, and a few other fruits not generally grown.

APPENDIX C.—FRUITS OF THE LAST SIXTY YEARS LIKELY TO PROVE PERMANENT ADDITIONS.

APPLES.

Allington Pippin.
Bramley's Seedling.
Cox's Orange.
Gascoyne's Scarlet.
Grenadier.

Lady Sudeley.
Lord Suffield.
Lane's Prince Albert.
Newton Wonder.
Peasgood's Nonesuch.

PEARS.

Beurré Hardy.
Beurré Superfin.
Durondeau.
Doyenné du Comice.
Emile d'Heyst.
Fondante d'Automne.

Marguerite Marillat.
Marie Benoist.
Oliver des Serres.
Pitmaston Duchess.
Thompson's.

PLUMS.

Count Althann's Gage.
Jefferson (American).
Pond's Seedling.
Transparent Gages.

Rivers' Czar.
Rivers' Early Prolific.
Rivers' Monarch.

CHERRIES.

Early Rivers.
Emperor Francis.

Frogmore Bigarreau.
Ludwig's Bigarreau.

FIGS.

Bourjasotte Grise.
Negro Largo.

St. John's.
Violette Sepor.

GRAPES.

Muscat Hambro.
Madresfield Court.

Mrs. Pince.

DAMSONS.

Frogmore Prolific.

King of Damsons.

RASPBERRIES.

Baumforth's Seedling.
Hornet.

Norwich Wonder.
Superlative.

STRAWBERRIES.

Auguste Boisselot.
Countess.
President.
Royal Sovereign.

Sir Joseph Paxton.
Sir Charles Napier.
Veitch's Perfection.

NECTARINES.

Dryden.
Early Rivers.
Humboldt.

Lord Napier.
Pine Apple.
Stanwick Elruge.

PEACHES.

Early Amsden.
Early Alexander.
Hale's Early.
Waterloo.

American.	Alexandra Noblesse.
"	Dymond.
"	Goshawk.
"	Gladstone.

APPENDIX D.

In the *Gardeners' Chronicle* for Nov. 20, 1841, the best fruits noted are :—

12 BEST APPLES.

Bedford Foundling.	Northern Greening.
Court Pendu Plat.	Ribston Pippin.
Dutch Codlin.	Rosemary Russet.
Hughes' Golden Pippin.	Sturmer Pippin.
Pearson's Plate.	Wellington.
Old Hawthornden.	Yellow Ingestrie.

6 BEST PEARS FOR WALLS.

Easter Beurré.	Gansel's Bergamot.
Crassanne.	Passe Colmar.
Glou Morceau.	Winter Nelis.

6 BEST PEARS FOR STANDARDS.

Glou Morceau.	Knight's Monarch.
Hacon's Incomparable.	Marie Louise.
Louise Bonne.	Passe Colmar.

6 BEST WALL PLUMS.

Coe's Golden Drop.	Kirke's Blue.
Green Gage.	Purple Gage.
Ickworth Impératrice.	Washington.

6 BEST STANDARD PLUMS.

Drap d'Or.	Nectarine.
Green Gage.	Perdrigon.
Purple Gage.	Royale Hâtive.

6 BEST CHERRIES.

Buttner's October.	Napoleon.
Early Purple Gean.	Royal Duke.
Late Duke.	Werder's Black Heart.

Other Lists of Fruits given in the *Florist* and *Pomologist*, 1837 to 1845, do not materially differ from the above, and many then on trial have fallen out of culture ; for example, Prince Albert Pear, of which very great things were once expected.

DISCUSSION.

The President said that they had listened to a very interesting paper. Mr. Bunyard must have taken immense trouble to prepare it, and it would have to be read and studied before they could fully appreciate its merits. He thought anyone must be blind who could not see that during the Queen's reign the advance in the cultivation of fruit had been made by leaps and bounds. He had recently been staying in a remote district in

South Wales, nearly 300 miles from London, where he had been able to buy excellent Muscat Grapes for 1s. 6d. to 2s. per lb., and he was quite certain that if he had wished to buy such Grapes in the London market twenty-five or thirty years ago he would have had to pay 7s. 6d., 10s. 6d., or even 15s. per lb. That state of things was, however, confined to the United Kingdom ; it did not yet extend to the Continent, or at least only to a few private gardens, where probably British gardeners were employed. He happened, for example, to be in Geneva during the time of last year's exhibition, and while there he was supplied by a member of the Rothschild family with some magnificent Grapes ; and he was certain, from the expressions of surprise on the part of the attendants at his hotel, that they had never seen such fruit before. He thought it but right to mention that the gardener at Geneva, under whose care the Grapes sent to him were grown, was without doubt a native of Britain, his name being John Smith. As to the size of Apples, he could not help saying that he did not attach great importance to that. If increased size meant the sacrifice of quality, he would prefer quality, as he cared no more for a 14-oz. Apple than he did for a 6-foot-4-inch man, if the quality suffered.

Touching on the question of fruit farming, he said that he thought that one of the reasons why we still import so much fruit is that the British farmer is very slow in acquiring new ideas, and could not learn rapidly enough to develop the fruit side of his farm. He believed it was greatly owing to the exertions of the horticultural trade of this country that such great advances had been made in fruit culture, and great gratitude was due to gentlemen like Mr. Bunyard, who had devoted themselves to improving the industry, and had brought their ability and enterprise to bear in that direction.

Mr. C. LEE CAMPBELL, of Glewston Court, considered that farmers approached their work with too much prejudice, and only a few men came prominently to the front by their energy and enterprise. Alluding to the subject of "packing," he said their watchword should be "honesty." The practice adopted by many growers in packing arose from the greatest carelessness, but in some cases it was otherwise ; and he would impress upon everyone that honesty in packing was not only the proper standard to adopt, but it was the best policy from a financial point of view.

Mr. E. POOLE, Clere Hill, Downend, said he made it a rule never to plant more than twenty different Apples, and in packing his maxim was, "No tops or bottoms, but the same quality all through." He attached the greatest importance to grading, and he would impress upon everyone that it took no more room to grow good varieties than it did bad ones. He also mentioned that in his neighbourhood there were orchards which had not been disturbed for forty years.

Mr. A. H. PEARSON, Chilwell, said, although his experience did not extend over sixty years, yet it had been considerable, and he never knew Apples to grow well where Apples had grown before. It was a most foolish thing to plant new fruit trees of any kind where old orchards of the same kind had only recently been removed. It was courting failure to do so.

Mr. ROUPELL, Streatham, said he was of opinion that the trained trees of fifty or sixty years ago were far superior to those of the present day. Everyone had gained enormously through the introduction of Cox's Orange Pippin, and if they had nothing else to boast of, that variety was one of which they might always be proud. As to growing for profit, he would only call their attention to what had been done with the Strawberry and the Tomato. There was practically an unlimited demand for Tomatos, and all that was essential was that they should be sent to market in good condition. The Tomato was not now so much used as a vegetable as a fruit, and he scarcely sold a pound of Tomatos except for dessert purposes or for salads. There was a great demand for the five-to-the-lb. smooth variety, and little for the great big corrugated ones. He believed money might be made by growing Tomatos, but their culture should be carried on near to a good market, so that they should not be handicapped by heavy railway rates.

Mr. JOHN WRIGHT, V.M.H., said they were under great obligations to Mr. Bunyard. He thought it only right to call to mind a fact which Mr. Bunyard's modesty had prevented his mentioning, and that was, that had it not been for Mr. Bunyard the Guildhall Show of 1890 would never have been held. Much opposition and adverse criticism had to be encountered, but Mr. Bunyard's foresight and determination overcame all difficulties. That exhibition was a magnificent one, and much good came of it. Gardeners were greatly indebted to the nurserymen of this

country for providing such excellent healthy trees at such reasonable prices. In old days people raised their own trees in various ways from seed and by grafting, and they filled the country with a lot of worthless stuff, which was a disgrace to the nation. All that had, however, been altered by the nurserymen of England.

FRIDAY, OCTOBER 1.

The Chair was taken at 3 P.M. by Philip Crowley, Esq., F.L.S., Treasurer of the Society, who called upon Mr. Arthur Sutton, V.M.H., who read the following paper :—

PROGRESS IN VEGETABLE CULTIVATION DURING QUEEN VICTORIA'S REIGN.

By MR. ARTHUR W. SUTTON, V.M.H.

Probably no more fitting subject could be chosen for one of the papers to be read at a Conference of the Royal Horticultural Society in the sixtieth year of Her Majesty's reign. And yet, though the subject is so appropriate, I cannot but think that a happier choice might have been made when selecting a speaker. It is manifestly impossible for anyone of my age to tell you from personal knowledge what the condition of the Vegetable garden was in 1837, and consequently it is impossible for me to say from my own observation what progress has been made.

My father (now in his eighty-third year) was in the first instance invited to contribute a paper on this subject, but, like many others whose memory carries them back over the past sixty years, his physical powers are not equal to his mental activity, and he was compelled to decline. And although yielding to the request that I would prepare a paper instead, I feel I owe an apology for attempting what others could do so much better. It was only possible for me to glean the necessary information from those who were actively engaged in horticultural pursuits at the time when our Gracious Sovereign came to the throne; and though I have met with the greatest willingness to impart knowledge, it is a somewhat remarkable fact that my correspondents have a far clearer recollection of fruits, methods of culture, and even the scale of garden wages than they have of the vegetables grown in 1837. I can only conclude that, as was no doubt the case, there was nothing very note-

worthy about the vegetables in use at that time, at least as regards their intrinsic merit.

It will be noticed that the title refers to Progress in Vegetable Cultivation, but I do not suppose I was intended to speak so much of the cultivation as of the improvement of the vegetables cultivated. Had it been otherwise, I cannot doubt that one of the many able gardeners connected with the Society would have been invited to read a paper rather than myself.

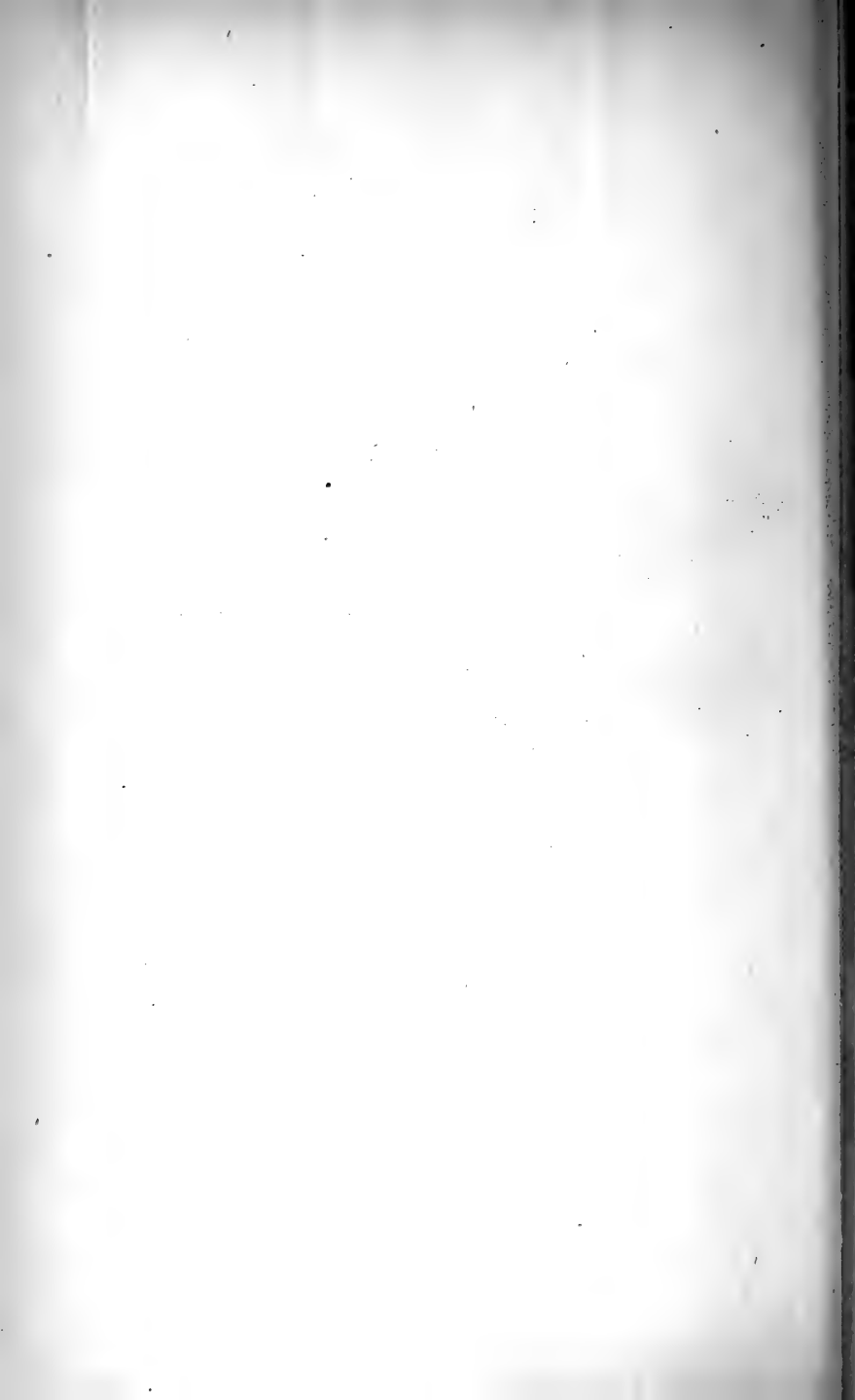
In sketching the outline of my paper I therefore felt that I could not do better than take the leading vegetables, enumerating the varieties in cultivation in 1837, and briefly mentioning the improvements that have since followed. It is obvious that unless there had been a very marked advance in the vegetables grown, the progress in cultivation would have been comparatively insignificant. In saying this I do not for a moment suggest that the gardeners of to-day are not far in advance of those of 1837, but that, whatever method of culture might be adopted now, no very great advance would be possible without improved vegetables to work upon. Without further introduction I will proceed at once to the all-important subject of the

GARDEN PEA.

Without hesitation I may say that the progress made during the last sixty years in the improvement of the garden Pea has been fully commensurate with the position this vegetable occupies, which may fairly be called the prince of all vegetables. I think also I am correct in saying that this proud position has been attained solely through the progress made in its improvement since 1837; an astonishing evolution, as I think all will admit when we compare the Peas of 1897 with those of 1837. In the thirties and for many subsequent years the gentleman's garden—as well as the market garden—was dependent upon such varieties as Woodford's, Bedman's Imperial, Scimitar, Early Charlton, Warner's Emperor, Early May, McCormick's Prince Albert, and Early Warwick, the other principal varieties cultivated being Blue Prussian, Bishop's Early Dwarf, and Auvergne. Such of these Peas as are still grown we, with better varieties at our disposal, now look upon as chiefly suitable for boiling in a dry state. Knight's Tall Green Marrow, a wrinkled Pea, was certainly available at that time, but was not so generally grown



FIG. 91.—PEA 'MAY QUEEN.'



as the round-seeded varieties, which an old gardener now living informs me were so hard and dry when cooked that they were known as Buckshot Péas.

During the next decade a few varieties such as Sangster's No. 1, Champion of England, British Queen, and Hair's Dwarf Mammoth were added to the list, the first three of which are still largely grown by those who have had no opportunity of testing better ones; but no considerable interest was awakened until the advent of that popular favourite, "Ne Plus Ultra," which was introduced under three or four names in as many successive seasons. Even at the present day, when testing year by year all the so-called novelties as they appear, it is frequently found that still another name has been added to the already long list under which "Ne Plus Ultra" is offered. Of its class, as a tall late marrow Pea, it is doubtful if any later introduction has ever shown, comparatively, a greater advance on the previously existing varieties.

In passing it may be of interest to some to know that three of the principal Peas distributed by my house in 1841 were Blue Prussian, Woodford's, and Scimitar, from which we may form a fairly correct idea of the class of Peas then grown by gardeners.

In the same year (1841) Mr. Nutting informs me that his father catalogued the following varieties:—Scimitar, Matchless, Warwick, Groom's Dwarf, Prussian, Woodford's, Dwarf Marrow, Charlton, Knight's Dwarf Blue, Racehorse, and Knight's Tale.

It is also interesting to record the fact that in the first catalogue of seeds issued by Messrs. Hurst and McMullen, in 1843, only five varieties of Peas were offered—viz. Auvergne, Early Kent, Waterloo, Victoria, and Knight's Marrow. The enterprise for which this house has always been noted soon manifested itself, for we find only three years later that the number of Peas had increased to fifteen.

Up to 1857 there had been introduced Daniel O'Rourke and Early Champion as representing improved types of early Peas; and Glory, Climax, Dickson's Favourite, Prizetaker, and Epps's Lord Raglan.

In 1859 that popular Pea, Veitch's Perfection, was introduced, and in the same year also the first selections of Dr. McLean's Seedlings were put on the market by Mr. Charles Turner,

including Princess Royal, followed a few years later by Little Gem, and these continued to be favourites for a quarter of a century. This was the commencement of a period of activity which has extended with increased vigour to the present day—the skilful hand of the hybridiser, in conjunction with the keen eye of the expert, producing such Peas as Her Majesty's gardener never dreamt of in 1837. Here I may remark that the work of selecting is in no degree less important than that of hybridising. This will be better understood when I explain that a seedling Pea is now generally the result of so much interbreeding that very many distinct types will often be represented in the ultimate cross. This cross will give a pod containing from six to ten or more seeds, and at this point the work of the hybridist ceases and that of the selector commences, but it is only a commencement.

When sown the following year these seeds will in all probability produce as many distinct seedling Peas, some partaking of the character of the parents and some not; but the difficulty increases when we find that seed saved from each of these plants very frequently varies in each case to such an extent that the greatest patience is required in order to secure any fixed type at all. Let me make my meaning still clearer if possible.

The first year we start with, say, six seeds in the one pod.

The second year we have six seedling plants.

The third year we have six rows, short or long, the produce of the six plants of the preceding year; but we may also find in each of these six rows Peas of all types, some tall, some dwarf; some early, others later; large and small podded; some pale green in colour, some dark; some curved in the pod, some straight; some pointed at the ends, and some square (this difference alone being sufficient in some cases to distinguish two popular garden varieties); and last, but not least, some may be round-seeded and some wrinkled-seeded. It is clear the selector must recommence with the most promising plant in each row, and endeavour to build up a seedling Pea which will reproduce itself from seed without variation—a task often extending over many years. In scarcely any instance known to me has a seedling Pea been put on the market without such selection as I have alluded to.

Between 1860 and 1880 many varieties raised by Dr. McLean

and Mr. Laxton were introduced, amongst them being Prince of Wales, Dr. McLean, Omega, William the First, and William Hurst, all of which are more or less popular at the present day. During the same period the first results attained by the veteran William Culverwell—whose excellent work deserves grateful recognition from all who value Marrowfat Peas—came to light in Telegraph, Telephone, Stratagem, and Pride of the Market, which varieties were introduced by Messrs. Carter. By this time Henry Eckford was endeavouring, and with considerable success, to infuse the blood of Ne Plus Ultra into a dwarfer race of Peas. From various sources appeared during the next few years Autocrat, Duke of Albany (which is certainly one of the most popular Peas of the present day), Sharpe's Queen, Webb's Wordsley Wonder, and others. In 1881 my house introduced American Wonder, which is still more extensively grown than any other early dwarf wrinkled Pea.

I should have preferred on this occasion to have made no allusion to the work of my firm in connection with the Pea, but I think all present will agree that no sketch would be complete without referring to the first early wrinkled Marrowfat varieties which have been introduced during the past few years, and in the selection of which I have personally been so much interested. I allude especially to May Queen (Fig. 91), A 1, Empress of India, Seedling, Excelsior, and Forcing, which have attracted so much attention at recent Temple Shows.

Our aim has been to replace the small, hard, round-seeded varieties, upon which the public formerly depended for their first supply, with Peas of dwarf growth, but equally early, and producing pods as large as Telephone, Duke of Albany, and Peas of that class, containing large wrinkled Peas of Marrowfat flavour, and we have succeeded beyond our most sanguine expectations. In Peas of a later class we have introduced other popular varieties, such as Royal Jubilee, Perfection (Fig. 92), Windsor Castle, Exhibition, Magnum Bonum, Late Queen, and others. The eagerness with which all these new Peas have been sought after as soon as they have been tried attests their value, and it is personally gratifying to me to know that Her Majesty—in whose honour we are met to-day—allowed the collection of Peas staged at the Temple Show in 1896 to be placed in the Entrance Hall at Windsor Castle for her personal examination, and

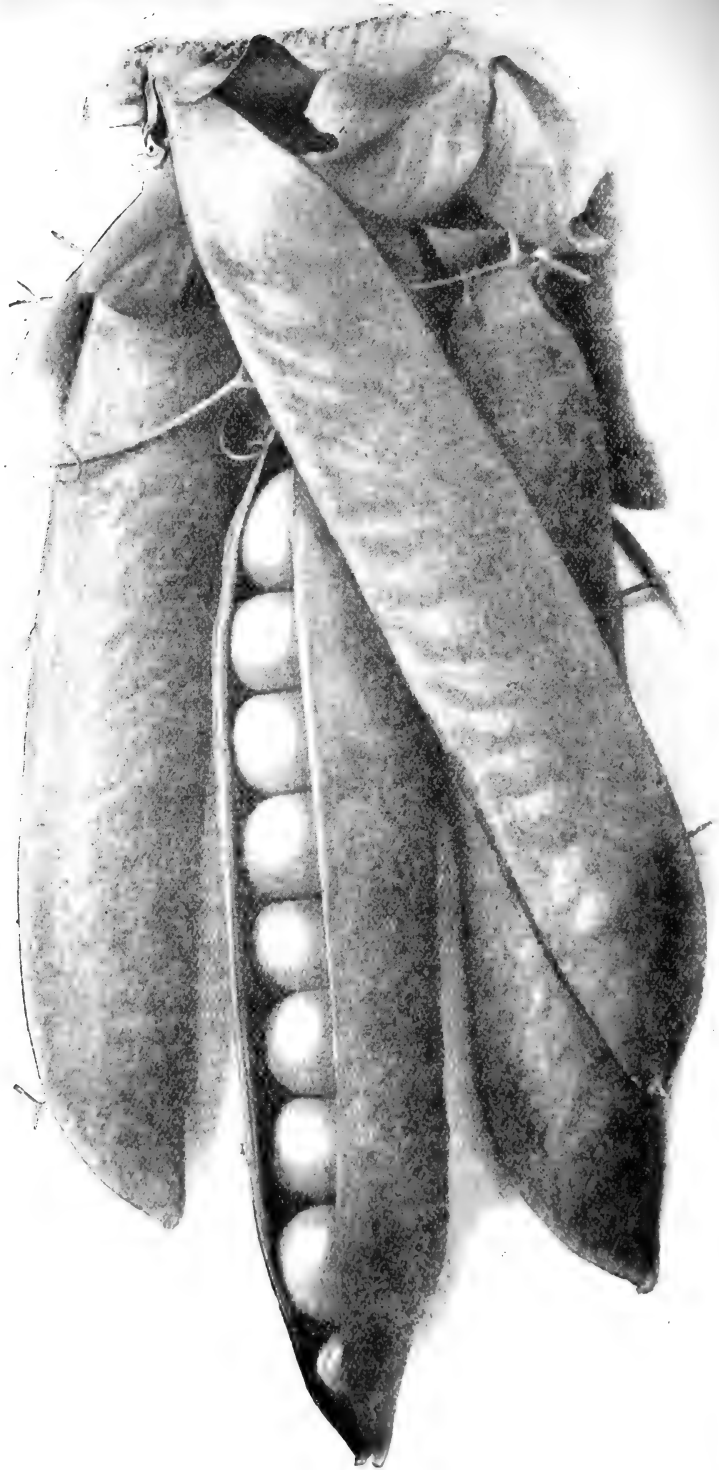


FIG. 92.—PEA 'SUTTON'S PERFECTION.'

that some of the Peas were served the same evening at the Royal dinner table.

During recent years the list of good Peas has also been added to by such excellent varieties as Daisy, Veitch's Maincrop, Alderman, Laxton's Gradus, and many others.

It may be as well to remark here that the improvement of Peas, as well as other vegetables, has doubtless received considerable impetus from the keen competition upon the Exhibition table—a hobby in which our older gardening friends seldom if ever indulged. This competition has likewise had a very marked effect upon the cultivation of Peas and other vegetables, so that with the fine types now procurable and the improved systems adopted by growers results are obtained which are really marvellous.

Before leaving this section reference must be made to the careful work done in the Chiswick Gardens in making trials of Peas for many years past. The value of these trials, great as it is, would be considerably enhanced had circumstances rendered it possible to grow a larger number of older varieties alongside the new ones for the sake of comparison. I may mention that in order to make our Reading Pea trials comprehensive enough to determine the value of new seedlings, and to fully test the older varieties offered, &c., it is necessary to sow from 600 to 700 rows annually.

BROAD BEANS.

In the early days of the Queen's reign lovers of this vegetable were relatively better off than those who preferred Peas, for there already existed such varieties as Mazagan, Dwarf Fan, Early Longpod, and the White and Green Windsors. These have, of course, been greatly improved upon; but they all remain in use, though it is somewhat surprising that the Mazagan should be grown at the present time, as in every respect it is surpassed by other greatly superior types.

The fact, however, that Beans in use sixty years ago are still grown seems to show that the advance has been less rapid than in the case of many other vegetables. The improvement that has been made is almost entirely the result of selection, although the crossing of Seville Longpod and White Windsor has produced a variety sent out by my house as Giant Windsor, which, as its



FIG. 93.—BROAD BEAN 'GIANT WINDSOR.'

name implies, is a much larger type of the Windsor section than previously existed. (Fig. 93.)

During the fifties the Seville and the Aquadulce Longpods—very similar varieties—were introduced from the Continent, and on account of their earliness and length of pod have been and still are largely grown, although the constitution of both plants is not nearly so vigorous as our English varieties.

Beek's Green Gem, a sport from the Dwarf White Fan, was introduced in 1858, and some years afterwards the market gardeners in the neighbourhood of Harlington, Middlesex, set to work to improve the Windsor by selection, and as a result of their efforts we have the Harlington White and Green Windsors.

Painstaking selection has done much for the improvement of the Longpod section, the several strains known as Exhibition being fine and profitable types; the best selections of which, both white and green seeded, sometimes contain as many as eight or nine beans in a pod, contrasting most favourably with the two or three beans found in the pods of the older varieties. The Broad Bean is not only greatly prized in private gardens, but is also an important article of food with the poorer classes, and the efforts made to increase its productiveness have been duly appreciated by all classes of society.

DWARF FRENCH OR KIDNEY BEANS.

There were several varieties in use when the Queen ascended the throne, but the difference chiefly lay in the colour of the seed; a feature of little importance except to those who keep a collection of these diversely coloured and pretty seeds. French Beans were, in fact, frequently named after the colour of or markings on the seeds, to wit the Zebra, Light and Dark Dun, Red and Purple Speckled, Negro, &c., the chief exception being Fulmer's Forcing, which was in use in 1837. The scope for improvement is limited to size of pod, earliness, and productiveness, and in the former respect Canadian Wonder as soon as introduced became very popular; while Ne Plus Ultra, of later introduction, fairly lays claim to being a marked advance over most others both for earliness and productiveness. Besides these such excellent varieties as Triumph, White-seeded, Forcing (Fig. 94),

Green Gem, Monster Negro, have appeared, and undoubtedly it may be said that they have come to stay. It was thought that



FIG. 94.—FRENCH BEAN 'SUTTON'S FORCING.'

the crossing of this section with the Scarlet Runner might produce useful results; but although many hybrids, combining

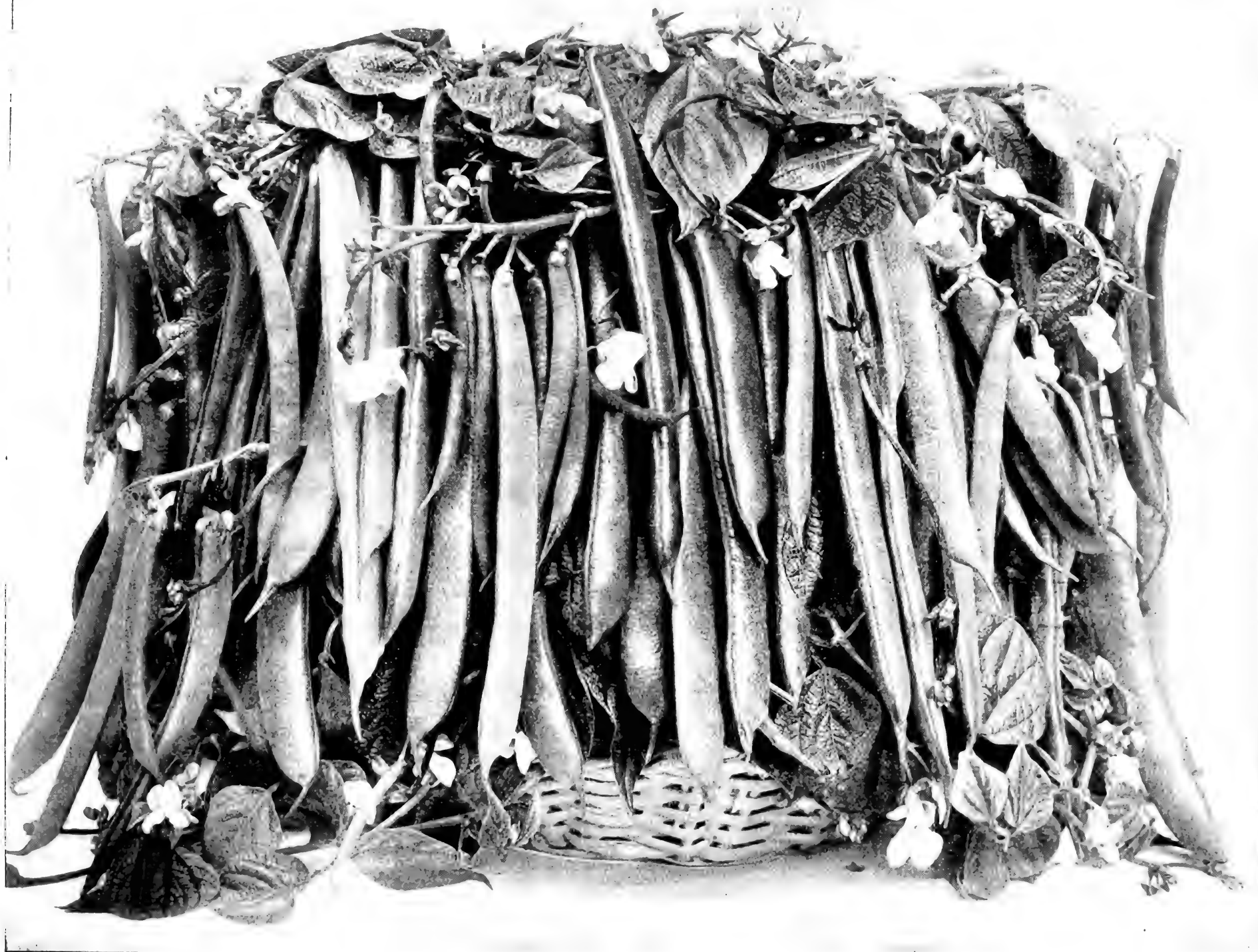
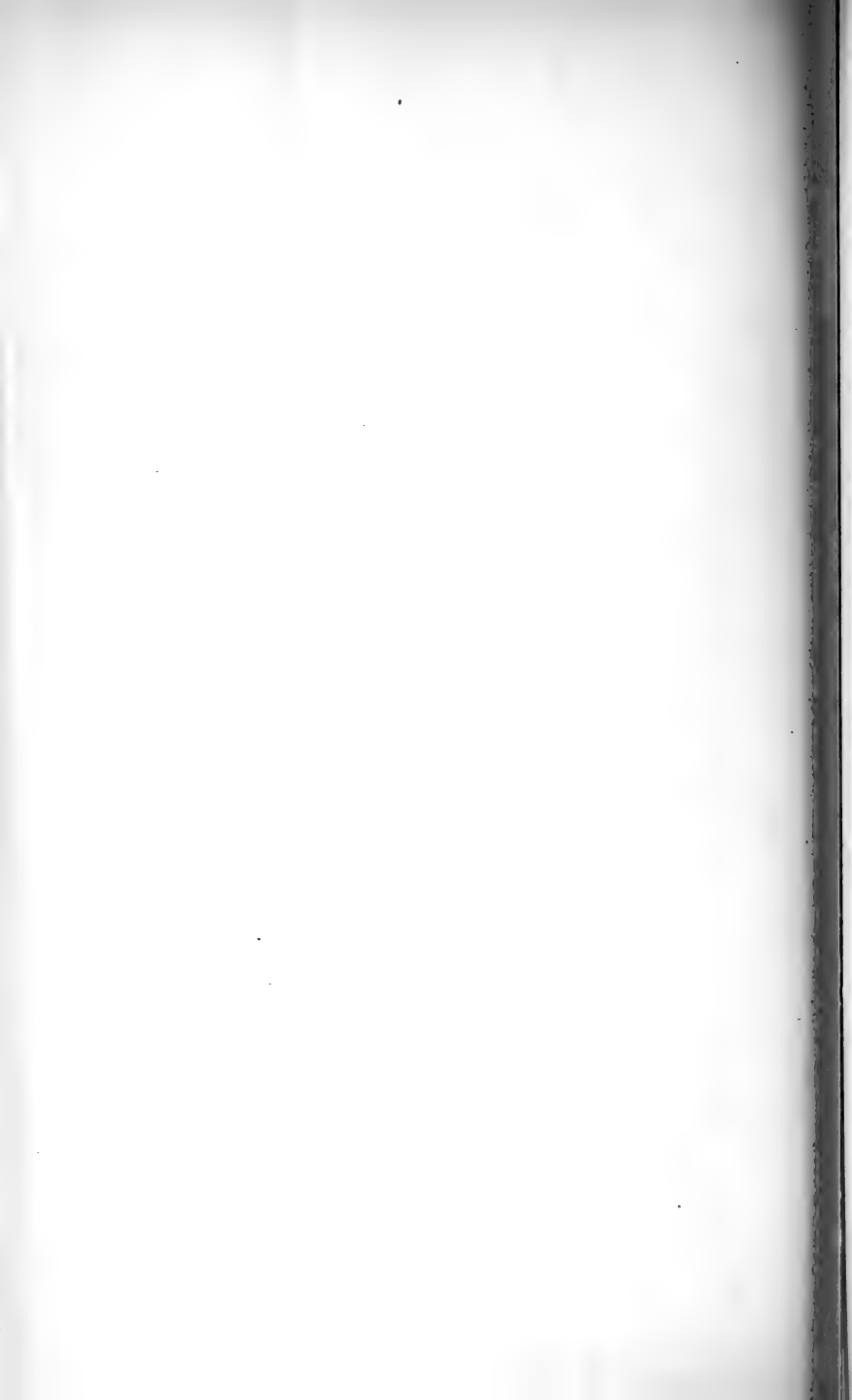


FIG. 95. - CLIMBING FRENCH BEAN 'EXCELSIOR.'



the broad massive pods of the Scarlet Runner with the habit of the Dwarf Bean, are in the hands of one or two experts, little if any advance upon such favourites as Canadian Wonder and Ne Plus Ultra has been made.

CLIMBING FRENCH BEANS.

One of the most notable improvements made in vegetables during Her Majesty's reign has been the creation of an entirely new race of French or Kidney Beans with a climbing habit of growth. There are several distinct types before the public, differing in the size and colour of the seed, shape and size of pod, and in earliness also. Amongst these are our Tender and True and Veitch's Climbing, both attaining a height of four to seven feet according to cultivation. A more recent introduction is our Excelsior—a Bean combining the delicacy and tenderness of Canadian Wonder with the vigorous growth of the Scarlet Runner. (Fig. 95.)

RUNNER BEANS

were represented sixty years ago by the old Scarlet, the Painted Lady, and the Large White; and although one or two varieties of recent introduction are the result of artificial crossing, the majority of the improved types have been obtained by selection. But even in some of these cases it is quite reasonable to suggest that they are natural crosses resulting from inoculation. Scarlet Runners producing pods $13\frac{1}{2}$ inches in length would have caused almost as much interest amongst the gardening fraternity of 1837 as did the advent of the first motor cab in the streets of London. That greater length will yet be attained I have no doubt, and with it an improvement in quality on some of the existing large podded varieties. The homely Scarlet Runner which Tradescant cultivated in his garden at Lambeth in the seventeenth century for the sake of its flowers can now in its improved form boast of an almost unlimited number of attractive names, each chosen to indicate a type of greater size or length than any previously quoted.

ASPARAGUS, &c.

Until quite recently English gardeners and their employers appeared to be quite satisfied with the Asparagus grown when

the Queen came to the throne, such as Giant and Battersea ; but the greater facilities for reaching the Continent have resulted in the desire to cultivate the varieties which produce the massive sticks so well grown in France. The most popular French strain is the best selection of Argenteuil, and when the English cook has learned to imitate more closely the methods of the French *chef* we shall doubtless find as delicate and delicious Asparagus in London restaurants as in those of Paris.

In like manner has the increased taste for Globe Artichokes been formed, a delicacy which was seldom grown fifty or sixty years ago.

The increased use also of Sugar Peas, Waxpod or Butter Beans, Celeriac, Chicory, Endive, Cardoons, Egg Plants, Silver or Sea-kale Beet, and other kindred subjects may be traced to the same cause.

We do not appreciate all the ways of railway companies, but they have undoubtedly been the means of introducing us to some of the more delicate and delicious vegetables of the Continent.

BEET.

Salads are much more popular now than they were sixty years ago, and as Beet perhaps comes next in importance to the Cucumber and Lettuce, the natural result has been a marked improvement in the varieties grown. In the early days of the Queen's reign "Dwarf Red," "Large Red," and "Turnip-rooted" were the ones in use. Seeing how difficult it is to obtain seed which will produce absolutely uniform results in colour of leaf, &c., it was a happy idea on the part of the seed seller of those days to protect himself by labelling the packets with such comprehensive names. It is quite certain that even now the description "Large Red" would be very applicable to strains frequently seen growing. In 1841 "Whyte's Black" was introduced, a variety almost black in the flesh, but inclined to be coarse in texture as well as strong in growth and with considerable variation in the colour of leaf. Notwithstanding these faults it is still to be found in nearly all seed lists, and presumably therefore has its admirers. Of late years a large number of improved types of this class have been seen, and those who fancy beets with flesh almost black have no lack of choice.

Later introductions which remain popular were "Nutting's

Dwarf," "Pine Apple," and "Dell's Black-leaved." Of the first and last various selections have been made, resulting in uniform and excellent types.

Within recent years "Cheltenham Greentop" has also come to the front, although I understand it has long been grown in the neighbourhood from which it takes its name. It is an excellent Beet, though disliked by some on account of the colour of the leaves. The "Turnip-rooted," so useful for shallow soils, has undergone great improvement, the flat type called Egyptian being almost superseded in English gardens by the introduction in 1891 of Sutton's Globe, which is as perfect in form and clean in growth as a Snowball Turnip. Many types of Globe Beet have also been introduced from America, but, generally speaking, the colour of the flesh is not up to the English standard.

A white Beet called Bassano was also grown in the thirties, but it never became very popular. In recent years efforts have been made to popularise a yellow-fleshed Beet, but although I can vouch for its excellent flavour the general public do not appreciate it.

A strange development in the leaves of the Beet has lately been observed, and we may soon see in our flower gardens a variety which produces a beautifully variegated foliage in addition to a handsome well-flavoured root.

THE BRASSICAS.—CABBAGE.

First and foremost in point of general utility comes the Cabbage. Although our forefathers had not so long a list of names to select from as gardeners now have, there were several good Cabbages in 1837. Chief among these were Early Battersea, Early York, Large York, Emperor, Sugarloaf, &c.—names which still retain a place in all seed lists, and are certainly valuable for spring sowing. It is reasonable to suppose that the crops of those days suffered from "bolters," and with none but these and similar varieties to grow the probability is that an even bed of Spring Cabbage would be the exception, as these varieties are all peculiarly liable to bolt. Of late years much has been done to avoid this tendency, and we now have such Cabbages as Ellam's Early, Early Offenham, Imperial, Flower of Spring, and Early April, which, when obtained true

to name, may be relied upon in any season to form solid hearts without bolting.

The improvement in the Cabbage has been entirely due to selection. The advent of the Nonpareil was a distinct gain to horticulture. Amongst others, Shaw of Newbury did much to make this Cabbage popular; and as it is one of the best for spring sowing, it will be long before it ceases to be grown. Enfield Market is popular where a large growing Cabbage is required. Almost every market-gardening district has its own particular selection, as seen in the Rainham, Higham, Evesham, East Ham, and Fulham varieties.

Rapid strides have been made in the improvement of early Cabbages for summer use, and although many of the earliest are of Continental origin we on this side can claim no inconsiderable amount of credit for careful selection. Earliest of All, Express, and their kindred types, are Cabbages which we could not now well do without, but on account of their tendency to bolt they must give place for August sowing to those previously named.

The Hardy Green Colewort was introduced in 1852, and a selection from it, Rosette Colewort, appeared a few years later. These give very important crops for consumption towards the end of the year, and are delicious in flavour.

RED CABBAGES have been so far improved that instead of relying on an August sowing for heads to use the following summer and autumn they can now be obtained in the same year by sowing in spring.

SAVOY CABBAGES, on account of the limited period in which they are required for use, have not had so much attention devoted to them, although it is now possible, by the use of recently introduced early and later varieties, to extend the supply from August to April if required.

BRUSSELS SPROUTS,

amongst Brassicas, stand next in importance to the Cabbage, Broccoli, and Cauliflower. This plant was well known in 1837, but since that time wonders have been accomplished in its improvement by means of selection, and we now have dwarf, medium, and tall varieties of great excellence. Scrymger's Giant, Dalkeith, and Reading Exhibition were among the earlier

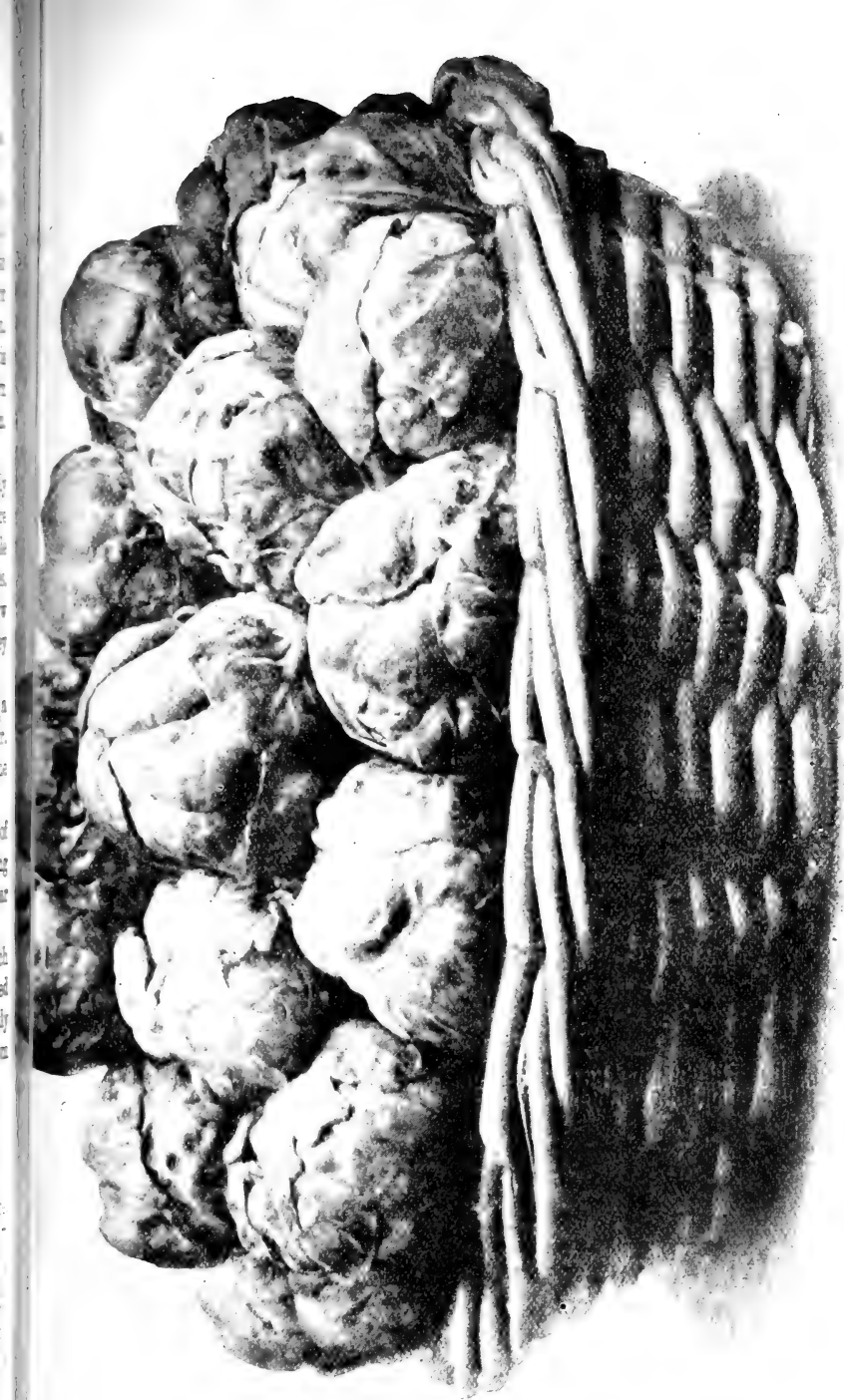


FIG. 96.—BRUSSELS SPROUT 'EXHIBITION.'

improvements, while the Dalmeny and Albert Sprouts, offered about 1858-59, had but a short-lived reputation.

A dwarf type, originating on the Continent and covered with close, firm buttons, has of late years given excellent results, the best strain being the Dwarf Gem. As is well known, the sporting tendency of the Brassicas is responsible for some very peculiar forms, and it is, I think, not at all unlikely that a Brussels Sprout with red buttons may eventually have a place amongst our favourite vegetables.

BROCCOLI

were represented in the earlier days by the Capes, Grange's Autumn, Portsmouth, Sulphur, Dwarf Russian, Purple Sprouting, and Knight's Protecting. In 1843 the popular Snow's Winter White was introduced; and although various and inferior strains have since been offered under this name, it is safe to say that in many cases the seed now sold is altogether superior to the original type. The following year Walcheren, which, perhaps, should be classed among the Cauliflowers, was brought to notice, and has done good service. After this came Adams' Early, Wilcove Late White, Dilcock's Bride, and White Sprouting. In later years Broccoli with white heads of closer and whiter texture have appeared, including Leamington (still one of the best), Perfection, and Late Queen. Great improvements have been made in Purple Sprouting Broccoli by selection, and it is now possible to grow three distinct types, the earliest of which is available for use at Christmas, the ordinary type following, and, lastly, a late selection of more compact growth and better coloured sprouts. The hardiness of these strains is an important feature, and their popularity must continue.

In the late Broccoli it has been difficult to retain lateness without in some degree sacrificing colour and quality, but I am pleased to note that a late Broccoli which continues good in quality longer than any variety with which I am acquainted, and with heads in every way equal to an autumn Cauliflower, is already in existence, and will certainly become deservedly popular. By these late, as well as the extra early, selections there is now no difficulty in having a succession of good Broccoli and Cauliflower throughout the year.



FIG. 97.—BROCCOLI 'SUPERB EARLY WHITE.'

CAULIFLOWERS

are scarcely to be surpassed for delicacy of flavour when properly cooked. Three types were grown in 1837, the Early, Late, and Asiatic. These were followed by the Stadtholder, Walcheren, Snowball, Erfurt, and Veitch's Autumn Giant. As Cauliflower seed can seldom be successfully grown in England, we are, of course, indebted chiefly to Dutch, German, and Italian specialists for most of the improvements made, and with the finest types of the Dwarf Erfurt section, such as Snowball and First Crop, at one end, and the early and late selections of the Italian Giant varieties at the other, we can extend the supply over a very much longer period than was possible sixty years ago. A head of Cauliflower, 36 to 38 inches in circumference, of perfect quality was a thing unheard of in 1837, but it is by no means uncommon to-day.

KALES.

The great diversity in colour and form of this section of the Brassicas at the present day would surprise any gardener who knew only the few varieties existing at the commencement of the Victorian era. The hardness of this useful vegetable has always been its most important feature, and it is to be hoped that the newer selections will retain this essential characteristic.

During the fifties Mr. Turner introduced the hardy and most useful Cottager's Kale, and it appears to increase in favour. Mention must also be made of the Variegated Kale, a highly ornamental plant as well as useful for cooking purposes. In mid-winter the charming colours of the leaves render them invaluable for decorative purposes.

THE CELERIES OF 1837

were the Italian, Red and White Solid, and Turnip-rooted; and although there are now many superior varieties, Celeries vary so little in character that there is less scope for great improvement than in many other vegetables. Much, however, has been done in improving the solidity and flavour, and amongst the reds may be noted Clayworth Prize, A 1, Standard Bearer, Sulham Prize, and Leicester Red, with Solid White and Wright's Grove White as the best of the white section. Probably the most dis-

tinct variety of English origin is White Gem, a small early Celery of great value.

Attempts have been made to popularise the Continental self-blanching varieties, but although they may be useful for soups they are practically of no value where tender, fine-flavoured Celery is prized ; for, except in appearance, they differ but little from unblanched English Celeries.

CARROT.

In Carrots the progress made has been very marked indeed during the period under review. Although there were several varieties grown in the early years of the Queen's reign, they were either very long, such as Altringham and Surrey, or of the horn section. Improvements on some of these quickly appeared, James's Scarlet Intermediate at once meeting with approval, and for market purposes it will doubtless long continue to be grown. Our French neighbours are adepts at the improvement of the Carrot, and the English trade is indebted to them in this respect to a larger extent perhaps than in any other vegetable. The French Forcing Horn and Nantes have met with warm approval, the finest types of the latter being particularly free from the objectionable yellow core existing in most varieties. It is only necessary to refer to the magnificent specimens of New Intermediate and Early Gem, and similar varieties which are so frequently seen on the Exhibition table, for evidence of the great improvement which has been made in this popular vegetable.

THE CUCUMBER

was represented by numerous varieties at the time of the accession of the Queen, chief among them being Early Frame and White and Black Spine, besides the so-called Long Prickly and Short Prickly Ridge Cucumbers. Snow, Cuthill, Mills, and Constantine were among the earliest improvers of this popular vegetable, and by 1842 many varieties were available.

Kelway's Victory and Phenomenon, Sion House and Victory of Bath, appeared during the fifties, and a few years later Berkshire Champion and Manchester Prize. It was then that Thomas Lockie took the Cucumber in hand, and Blue Gown (and its sport Tender and True), Royal Windsor, and the deservedly popular Lockie's Perfection were the leading varieties raised by him. Meanwhile others, including Telegraph and

Cardiff Castle, obtained a leading place, and it will be a long time before Telegraph is superseded for general cultivation.

I have not inquired from the Messrs. Rochford how many years the Rochford Cucumber has been in their family, but it is probably more sought after by growers for market than any other variety. In recent years the palm for raising improved varieties must certainly be given to Mr. Mortimer, whose wonderful exhibits at the Society's meetings and elsewhere have been greatly admired. Sutton's A 1, Peerless, Progress, and Matchless are results of his painstaking work.

Notwithstanding the almost endless varieties now procurable, it is generally admitted that none of them supply the ideal type required for cultivation on a large scale. For productiveness none equals the best strain of Telegraph, but its somewhat pale colour, especially when the plants are bearing a heavy crop, lessens its value for market purposes; and if the Council of the Royal Horticultural Society should see their way to undertake a series of trials at Chiswick I would gladly offer a prize of £5. 5s. for the seedling Cucumber, raised since 1896, which shall combine the productiveness and excellent form of Telegraph with the dark colour of Rochford's Cucumber.

THE LEEK

in 1837 was represented in this country by the Common and Flag types, although it is on record that in the previous year four Scotch Leeks were produced in Edinburgh with a circumference of 9 inches or more. A Scotch gardener now living informs me that although he came to England in 1854 it was several years before he saw Leeks grown here. The Musselburgh was one of the first improved forms, followed by Ayton Castle and Henry's Prize. The greatest triumph, however, is found in The Lyon and the better selections of this good variety, such as Prizetaker, appear to present as perfect a form of Leek as it is possible to obtain or desire.

In this connection may be mentioned the excellent work done by the Messrs. Dobbie, who have introduced one or two very fine selections of Leek as well as of several other vegetables.

LETTUCE.

The number of varieties, both Cos and Cabbage, has wonderfully increased during the past twenty years, and they embrace many types and shades of colour.



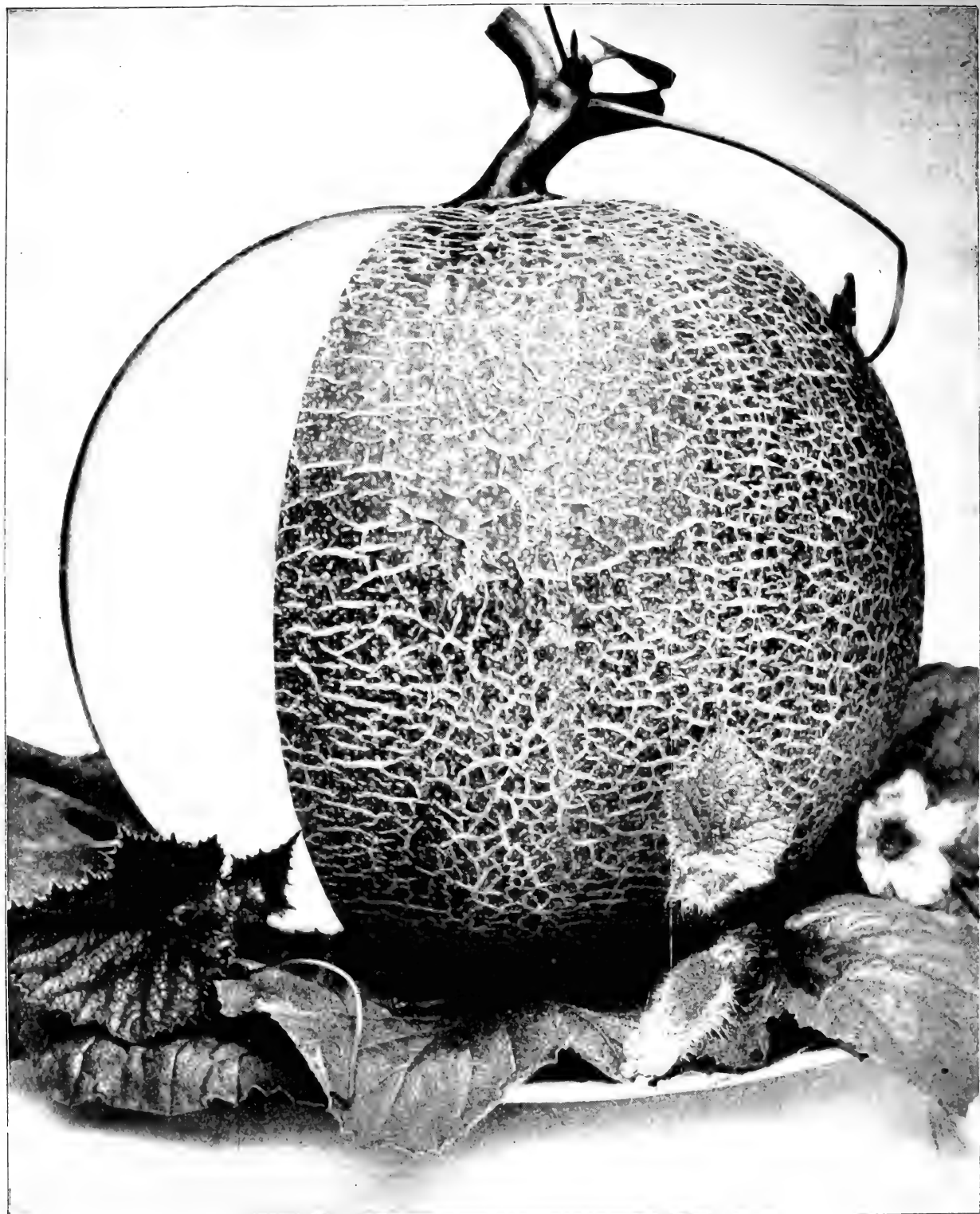


FIG. 98.—MELON 'ROYAL FAVOURITE.'

In 1837 several of the leading varieties of the present day were in use, including, amongst the Cabbage varieties, Brown Dutch, Brown and White Silesian, Drumhead, Grand Admiral, Hammersmith, and one or two others; and in the Cos, White seeded and Black-seeded Bath, Florence Green, White, and Spotted.

By 1842 Paris White and Green were announced, and the various selections of this type are amongst the best Cos Lettuces at the present time. More recently a very large form of great excellence, named Mammoth Cos, has appeared and is very popular. White Heart, intermediate in colour between Paris White and Green, deserves a place as a popular introduction of recent years. With regard to Cabbage Lettuce the number of varieties now available is extraordinary. All the Year Round was amongst the first improvements, and so good is it that it has been honoured with several distinctive names. Wheeler's Tom Thumb, Veitch's Perfect Gem, Standwell Green, and others are excellent varieties largely grown, while more recently Commodore Nutt, Favourite, and Daniel's Continuity are improved types of great merit, the two latter standing longer than any other without running to seed.

Recently my house has introduced the Intermediate—a variety resulting from a cross between the Cabbage and Cos Lettuce, which is highly prized by many.

THE MELON

has advanced during the past sixty years by leaps and bounds. Every year witnesses the advent of new varieties, and the Fruit Committee of the Royal Horticultural Society can testify to the constant succession of aspirants for honours.

In 1837 gardeners depended upon the Cantaloup, Scarlet-fleshed, Green-fleshed, Lord Sondes, and Queen Anne's Pocket. In 1842 Windsor Prize Green and one or two scarlet-fleshed fruits were distributed. Ten years later Beechwood, Bromham Hall, Victory of Bath, and other standard varieties were grown, followed at short intervals by Scarlet Gem, Blenheim Orange, Hybrid, Cashmere, Imperial Green, and Hero of Lockinge, the latter still retaining the first place as the best Melon for frames. So easy is its culture that it has acquired the reputation of being essentially the amateur's Melon.



FIG. 99.—ONION 'TIE QUEEN.'

In connection with improvement in Melons much good work has been done by Mr. Owen Thomas, of the Royal Gardens; Mr. Wythes, of Sion House; Mr. Chas. Ross, and many others. In 1894 we introduced a handsome white-fleshed variety raised by Mr. Thomas named Royal Favourite (fig. 98), and other noteworthy Melons have also emanated from the Frogmore Gardens.

ONIONS.

were represented sixty years ago by Blood Red, Deptford, Silver-skinned, Globe, James's Keeping, Lisbon, White and Brown Spanish, Portugal, and some of the Tripoli varieties. While most of the types have undergone more or less improvement, special attention has been given to the Spanish class. The Reading was a valuable selection, and it was followed by Improved Banbury, named after a town which has long been noted for its Onions. The late Mr. Deverill, of that place, introduced many fine types, such as Rousham Park, The Wroxtton, Anglo-Spanish, and others. Banbury Cross, a comparatively recent introduction of fine quality, also came from the same town.

The justly celebrated Ailsa Craig (with Cranston's Excelsior, a very similar Onion) has caused quite a revolution in this vegetable. One celebrated grower in 1896 exhibited twelve specimens weighing no less than $37\frac{1}{2}$ lbs.—an enormous weight for this country, which would have startled the growers of the olden days, who had to be content with small specimens weighing a few ounces each.

Until quite recently it had not been possible to obtain seed of the fine Spanish Onions of the grocers' shops; and although specimens grown in this country are not often so large as imported bulbs, some very fine Onions can be grown by sowing the seed in heat in January and transplanting in April.

THE PARSNIP

has certainly been much improved since the Guernsey and Hollow Crown were the only available forms, although no very great increase in the number of varieties can be reported.

As late as 1852 the only parsnip quoted in a leading seed list was Hollow Crown. The Student, obtained by the late Professor Buckman, by continual selection from the wild Parsnip, and distributed in 1860, is still regarded as a popular variety, and

has been singularly successful at Shows. Quality in a Parsnip is almost entirely a matter of selection, and in that way the fine types now in cultivation have been obtained. Carter's Maltese marked a distinct advance and is still widely grown. Quite recently at the Reading Show, where the general opinion was that so extensive and fine a collection of vegetables was never before staged in competition, some of the collections contained remarkable specimens of a new variety called Tender and True. This is certainly distinct from other varieties, and possesses quality which has not hitherto been reached in this vegetable.

SPINACH.

No great advance was made in this vegetable until a few years ago, when the Victoria and other similar strains were introduced. It is true that many varieties bearing Continental names have been grown, some standing rather longer than others before running to seed, but the difference was only slight. With the advent of the Victoria, however, the duration of the crop was greatly prolonged, and still more recently this variety has been surpassed, and we now have both in the round and prickly seeded sections strains of Spinach which remain good for weeks after others have gone to seed.

Time will not permit of my referring to Parsley, Rhubarb, Vegetable Marrow, and some other vegetables, and I must pass on to

THE TOMATO,

which has increased in popularity to a greater extent and more rapidly than any other vegetable referred to in this paper.

A proof that it was not much cultivated in the early years of Her Majesty's reign is shown by the fact that in a wholesale seed list published in 1852 the only Tomato mentioned is the common Red. It is within the last quarter of a century that such an enormous impetus has been given to the growth of Tomatos, in consequence of the more cultivated taste of the masses of the people, and it is now found in almost every garden, from the cottager's upwards. The Queen's gardener (Mr. Thomas) has identified himself with its improvement, and Frogmore Selected is one of the best varieties grown at the present day.

The introduction of the Perfection type was the prelude to that of many others, and now the number is legion. New selec-

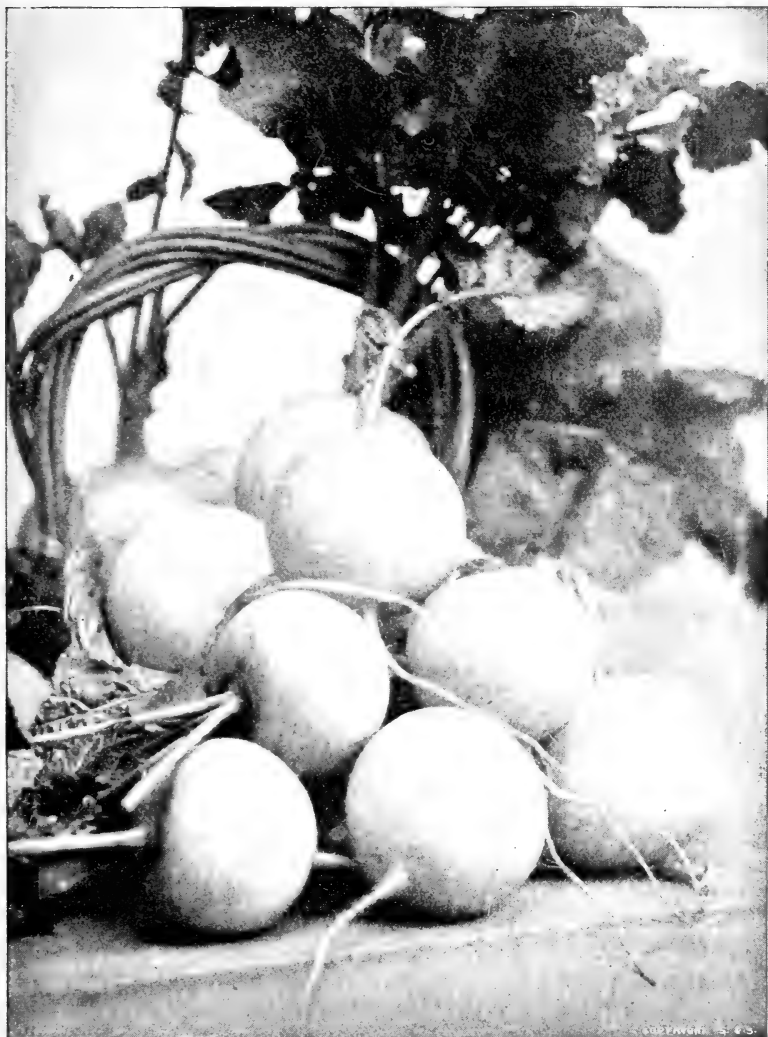


FIG. 100.—TURNIP 'SNOWBALL.'

tions are plentiful enough, as is proved by our own trials of over 200 groups this year.

To mention in detail anything like the whole of the varieties which deserve notice would take up too much time, but for earliest out-door use Conqueror, Earliest of All, Conference, and Early Ruby are popular varieties. Fine, shapely fruits and plenty of them are produced by Ifield Gem, Eclipse, Best of All, Duke of York, and Ham Green Favourite, and in yellow varieties Golden Nugget as a small fruited variety, and Golden Queen may be relied on to ripen early and produce good crops.

Mention must also be made of the very excellent golden yellow or Orange Tomato, called Golden Jubilee, raised by Mr. Thomas, which forms a striking feature in the Royal trophy at this exhibition.

Strange developments, in which the fruit partakes of the character of the Peach, are observed in certain forms, and the crossing of the Peach Tomato with Perfection has resulted in some charming types.

With white, yellow, orange, pink, ruby, and scarlet varieties, not to mention the varying sizes and shapes, there is a wide choice for the most fastidious, both as regards external appearance and flavour.

GARDEN TURNIP.

A brief reference must be made to the Garden Turnip. In the early days of Her Majesty's reign as many yellow as white varieties were offered, although the demand for the former has certainly not increased in proportion to that for the white fleshed ones.

Amongst the many improvements may be noticed Veitch's Red Globe, Snowball (fig. 100), Dobbie's Model, and Golden Ball, while the Red and White Milans are varieties arriving at maturity quicker than any others. These should not be confused with their prototypes the Red and White Strap-leaved, which have almost had their day.

Of the varieties imported from the Continent, apart from the Milans, much selection and improvement has been necessary to make them worthy of a place in English gardens.

POTATOS.

It will obviously be impossible for me, at the close of this lengthy paper, to attempt to describe at all adequately the

improvements effected in the Potato during Her Majesty's reign, and as I have already in my paper on "Potatos" (published in vol. xix. of the Journal of the Royal Horticultural Society) dealt somewhat fully with this subject, I must content myself now with the fewest possible remarks. As long ago as 1836 Messrs. Peter Lawson & Sons published a descriptive list of 146 varieties, and amongst some forty-five of the principal of these I only find one which is still widely grown, viz. the Early Ashleaf. There are other familiar names such as Early Shaw and Dons, but the remainder must have passed out of cultivation at least twenty-five years ago.

In 1852 the old Walnut-leaf Kidney, Early Oxford, Forty-fold, and York Regent were grown—all varieties of real merit in their day—but now seldom met with. That excellent Potato Paterson's Victoria was widely cultivated up till 1880, but it would be difficult now to find an acre of it true to name. The fact that almost all these have disappeared from sight does not of itself necessarily prove that they were worthless or even inferior to others grown at the present time; for it is generally admitted that the majority of Potatos will not maintain their full vigour of growth and constitution beyond a certain time, the limit varying with each individual variety. This is not to be wondered at when we remember that each year's growth is but the prolongation of the life of the plant, which apparently had completed its work when the haulm died the preceding autumn.

At the same time I have no doubt whatever that even if we could reproduce such old favourites as the Regent, Paterson's Victoria, &c., in all their former excellence, and plant them by the side of the best Potatos of to-day we should find that very great progress had been made, not merely in productiveness and power of withstanding disease, but also in flavour—a point in which the older varieties are often supposed to have excelled. We now have in Ringleader, A 1, Early Puritan, &c., first-early forms which are ready for use long before the so-called early Potatos of twenty-five years ago; we have also several second-earlies, as Beauty of Hebron, Supreme, Early Regent, and Windsor Castle (fig. 101), which certainly were not equalled by any of the older varieties in their own section. Whether these will still retain their good qualities unimpaired twenty-five or fifty years hence no one can say, though in all probability—as they them-

selves are instances of the survival of the fittest, in so far that they were chosen from thousands of less promising seedlings—several of them will doubtless greatly exceed the limit of age reached by older varieties.

In the Late and Maincrop section nothing has yet approached *Magnum Bonum* in popularity, and it is quite as good now as when introduced twenty-one years ago. There are many other varieties of a similar character; but on the closest scrutiny I have failed to detect any point in which they differ from *Magnum Bonum*, and I have generally found when any difference



FIG. 101.—POTATO 'WINDSOR CASTLE.'

has been suggested that the varieties in question were not grown alongside under the same conditions, or else that the seed had been obtained from different sources, a change of seed often producing a marked divergence in two rows of the same variety.

I must not leave the subject of Potatos without mentioning such names as the late James Paterson, Mr. Robert Fenn, the late James Clark, Mr. Archibald Findlay, Mr. A. Dean, and Mr. Chas. Ross, all of whom have devoted many years, perhaps the best years of a lifetime, to the improvement of the noble tuber ;

and to these men the whole horticultural fraternity and the community at large are greatly indebted.

I have now passed in review all the leading vegetables; and, imperfect as this paper has been, I think it will be admitted that the progress in vegetable cultivation, in its effect on the promotion of health and daily comfort among all classes of the community, is worthy to rank with the achievements in lighting, locomotion, and sanitation.

What the progress in the next fifty or sixty years may be no one can foretell; but on behalf of the seed trade I can only express the hope that it may be accompanied by a corresponding decline in the demand for older and inferior forms, for the labour and anxiety of keeping the rapidly increasing number of varieties true to name can only be fully appreciated by those acquainted with the details of seed growing.

DISCUSSION.

Mr. N. N. SHERWOOD, V.M.H., said that, having himself been in the wholesale seed trade for forty years, he had taken great interest in hearing the paper, and he bore testimony to the able way in which Mr. Sutton had dealt with the subject. It might perhaps be asking Mr. Sutton to disclose trade secrets, but it would have been highly interesting to have known the difference in the amount of trade done by Mr. Sutton's firm now and sixty years ago. Speaking from his own experience, Mr. Sherwood said he was absolutely astounded at the enormous demand for seeds which had sprung up during the last sixty years, and it proved that people not only wanted good vegetables but plenty of them as well.

Mr. GEORGE BUNYARD, V.M.H., said he had been forty-two years in the retail seed trade, and what struck him most in Mr. Sutton's paper was the wonderful way in which he had been able to recall the names of old varieties which had long since passed away. With regard to Mr. Sutton's eulogium of 'Ne Plus Ultra' Pea, Mr. Bunyard thought that in 'Alfred the Great' we had all the good qualities of 'Ne Plus Ultra' combined with a somewhat more vigorous growth and two or three more Peas in each pod. Mr. Bunyard mentioned, as a curious example of reversion, that not at all unfrequently with Runner Beans if white seeds are sown the produce will be of the colour

of the original form before hybridisation, and in the same way red seeds produce white ones. As a general rule he discountenanced vegetables being too big—overgrown. The true test of a vegetable lay in the hands of the cook, and the smaller the vegetable the more likely it was to get cooked right through. In dealing with Tomatos he noticed that Mr. Sutton had omitted the 'Conference' Tomato, raised in connection with the Chiswick Conference some years back. He would like to bear testimony to the marvellous work done by Messrs. Sutton in regard to the Potato; but he could not help thinking that one great mistake had been made in sacrificing, in so very many cases, good flavour for a big crop. The 'Windsor Castle' was one of Messrs. Sutton's triumphs, being one of the finest Potatos ever grown. They owed a debt of gratitude to the Americans for introducing 'Early Rose' and others; for, taking things all round, he thought there was no Potato for field or garden culture equal to the 'Beauty of Hebron' and the 'Puritan.' Turning to another view of the question, Mr. Bunyard spoke of the false policy of buying cheap vegetable seeds, characterising it as the greatest folly that could be perpetrated. He constantly saw vegetable seeds advertised for sale which could not be properly grown for the money. Very few people had any idea of the great care and attention necessary in making a proper selection, extending over a number of years. There was a tendency on the part of all vegetables to revert to some former type, and that required the greatest care in watching. He would therefore counsel people not to buy cheap seeds at any price.

Mr. FYFFE said that many Peas were sent to Chiswick for trial without any definition, and he would suggest that in the next year's publication of the Royal Horticultural Society people should be asked to send in proper descriptions, so that the Superintendent could have the older varieties grown side by side with the new.

The CHAIRMAN said there was one tendency at the present day which ought to be checked, and that was allowing old friends to appear under different names. At Chiswick, for example, they had some thirty varieties of Beet sent under different names, but upon examination there were found to be only five different varieties. As to new Melons, at least nineteen out of twenty that came before them were worse than their parents.

Mr. SUTTON, in reply, said much valuable work was done at Chiswick, but the trials to be of value should be greatly extended. It would be better to have a Pea trial once every four or five years, and to do it exhaustively, than to but half do the work year by year. With regard to the 'Conference' Tomato, it was one of the very finest types grown. As to the Potato, it was necessary to have a good crop, but they should also be determined to have the finest quality also.

SATURDAY, OCTOBER 2.

The Chair was taken at 3 P.M. by William Marshall, Esq., member of Council, who called upon Mr. J. Assbee, who read the following paper :—

THE PROGRESS OF MARKET GARDEN CULTIVATION DURING QUEEN VICTORIA'S REIGN.

By Mr. J. ASSBEE, F.R.H.S.

The memorable year of Jubilee, now drawing to its close, has led to many useful and interesting comparisons between the existing state of things and those of sixty years ago. And this annual gathering of the Royal Horticultural Society within this famous Gardeners' Palace seems a most suitable opportunity for reviewing gardeners' work, and it is my pleasing duty to endeavour to show to what extent market gardeners—that is, those engaged in cultivating vegetables, fruits, and flowers for market supply—are progressing and keeping pace with the times in which we live. Let us take a brief survey of the origin and growth of the market gardener, the necessities which caused his existence, and the important position he fills in supplying our daily wants. Originally we may suppose every man to have been his own gardener; but as the world became more thickly peopled, and communities became established, towns sprang into existence, and with these market gardeners. In small towns even to the present day the wants of those who cannot cultivate garden produce for themselves are supplied by small local farmers and gardeners, who bring in on market days such mixed loads of farm and garden produce as the successive seasons yield, and housewives largely attend such markets and purchase for themselves. In larger communities the public are mainly supplied

by shops, and the shopkeepers buy at markets. The markets under such conditions become specific instead of general, and are held much more frequently. Hence arose daily markets whereat only garden produce was dealt with, and thus market gardeners became a special class of producers.

The great changes brought about by the discovery of steam, and its application as a motive power, have entirely altered the conditions of life amongst a large proportion of our working population. The inventor has produced the manufacturer, who has caused densely crowded towns full of hungry workers and a busy middle class to arise as by magic, even in quiet rural districts, whilst larger towns (especially London) have increased beyond conception. This has had a corresponding effect upon our market gardener. Driven from his original suburban holdings by the advancing town, he is bound to seek fresh fields and pastures new. His few acres at Battersea, Chelsea, Fulham, Hammersmith, Peckham, Deptford, and other near neighbourhoods have to be vacated for farms in a wider area, but within carriage distance, enabling him to attend a market centre. Nor is this all. For, by a wise dispensation of Providence, the same motive power which has been so instrumental in causing mankind to congregate into large centres has also opened up fresh and more distant fields, both native and foreign, for their supply. Thus the market gardeners near the great centres of consumption are now brought into competition with a more distant class, who have sprung into existence in localities where the soil and position are favourable to special productions. In addition to this there can be no doubt but that the increase in wealth and purchasing power, accompanied by higher tastes and improved education, has made greater demands for variety and higher excellence in our food supply, and an additional impetus is given in this direction by the dietary prescribed by the highest medical and sanitary authorities. Thus we are living in an age which demands infinitely more, both in quantity, quality, and variety, from our market gardeners.

Let us now turn and see to what extent these public wants are met. But before going into the question of his productions I should like to take a snapshot at the typical market gardener of sixty years ago, of whom a few examples may still be found. There he stands, possibly on the same stand as his forefathers

did, selling almost identically similar produce—a sturdy, kindly personage, with a certain dry humour and considerable individuality. Both at home and at market you will find him thrifty and industrious. His business is his study, and well he knows what to grow, and when and how to grow it. He has no speculation in his character, and he is quite content that others should test the value of new varieties before he leaves the cultivation of old and approved favourites. Occasionally, however, he devotes himself to a special line of vegetable or fruit, and in some cases has produced valuable and improved varieties. If you care to converse with him he can recall many happy times of interest in the past, and can quote you prices for produce which the purchasing public may be glad we are never likely to see again. Well, if we must lose our respected old friend, let us be thankful that his place is being so well filled with sons and successors possessing all the sterling good qualities of the father, and in addition thereto a superior education, newer and wider ideas of business, and an energy, perseverance, and skill in production which have raised our market gardening industry into a position of the highest national importance.

I propose to take the productions of our present market gardeners in the following order:—1, Vegetables; 2, Fruits; 3, Flowers; each of which may also be subdivided into out-of-door or naturally grown varieties, and in-door or forced varieties.

VEGETABLES—OPEN GROWN.

With regard to naturally grown vegetables I may say that the cultural details of sixty years ago, with very few exceptions, remain the standard of the highest present perfection. It is in the direction of earlier and improved varieties, and in the increase in quantities rather than in the methods of culture, that a comparison will mostly tell. I do not propose to enumerate the kinds of Vegetables or the varieties which have been successively cultivated during the period under review, but I propose rather to touch upon a few marked cases where important varieties have been introduced, or new and extended fields of culture have been opened up.

ASPARAGUS very fitly commences my list, as its cultivation gives a striking illustration of remarkable progress. Many acres

of this wholesome spring delicacy have been laid down during the past few years in places where the soil and situation are favourable. The so-called "grass" has become known by the locality from which it is produced, such as Worcester Grass, Cambridge Grass, Sandwich Grass, &c. Though our local Middlesex growers still bear the palm for excellence, I may perhaps be excused if I quote the Worcester or Evesham field as a sample of progress. About twenty-five years ago certain gardeners in the Evesham Valley began to grow Asparagus as a market vegetable. These growers were happily brought into touch with Covent Garden salesmen, who taught them to properly grade and pack the bundles for the market trade. The prices proving remunerative, and the demand largely exceeding the supply, a considerable development of the industry followed, and the railway, waking up to the importance of encouraging a good customer, granted better facilities for transit. It is now estimated that there are about 4,000 acres of Asparagus in this district alone. Each acre in full bearing will give 40,000 sticks, or 400 bundles, of which about two-thirds come to London. These figures are a moderate computation, and are small compared with our importations of foreign Grass.

CELERY is another example of extended cultivation. The increasing value of Celery as a vegetable, either cooked or raw, has no doubt had a stimulating effect upon its production. In Lincolnshire many hundred acres are grown for market; indeed, it may be regarded as a regular alternative crop with other market vegetables in the black soil belt of the Trent Valley. It affords another illustration of the railway system as an artery of food products, beneficial alike to grower, consumer, and carrier. As much as fifty tons of celery a day is brought to London by the Great Northern Railway in the season.

PEAS.—The cultivation of this most important summer vegetable has made great strides, particularly in the Essex district. Our earliest Peas come from Kent and other southern counties, and our latest from Yorkshire. The season lasts from the end of May or beginning of June till August. The establishment of the Great Eastern Railway Company's depôt for Essex garden fruit has more than doubled the tonnage of Peas brought by them into the London markets, and opened up a great outlet for other kinds of market produce.

ONIONS.—The introduction of the Spanish and Tripoli Onion has had a considerable effect in improving our English varieties. The market gardener finds a considerable sale for bunched young Onions during the spring and early summer months. When I read that over 6,000,000 bushels of Onions, valued at £684,000, were imported into this country in 1896 we cannot consider that we are overburdened with our home supply.

POTATOS.—These are in every respect the leading vegetable at present in use amongst us. The small market gardener has to a very great extent given over the cultivation of this and certain other vegetables to the farmer-gardener, if I may so designate those large growers who combine farming with the production of market crops. There were 563,741 acres of Potatos grown in Great Britain in 1896. These were estimated to produce 3,562,235 tons. Out of this quantity Lincolnshire, our largest Potato-producing county, grew 57,638 acres, producing 400,709 tons; whilst Yorkshire grew 51,495 acres, yielding 326,849 tons. There does not seem to have been any great increase in the quantity of Potatos grown recently in this country. The Great Northern and Midland Railways have established dépôts for the convenience of this trade, and as many as 1,100 truck loads of Potatos arrived at the Great Northern dépôt in one day last season. Great as is our Potato production there is still a large foreign importation, chiefly of early varieties, from the Canary Isles, Jersey, and the Mediterranean, as well as from Holland, the value of which is about £1,000,000 a year. No vegetable has been so prolific of varieties grown as the Potato. Most of our new ones only last a few years, to be in turn superseded by so-called improvements supposed to possess better qualities. The great object of the Potato raiser is to secure (1) a plentiful cropper; (2) a good eater; (3) a disease resister. Of late years the system of spraying has been introduced to accomplish the latter object.

BROCCOLI and **CAULIFLOWER** have been greatly improved and their period of growth extended chiefly by the introduction of Veitch's Autumn Giant, which was a grand example of a new variety fulfilling a decided trade want. Cauliflower and Broccoli might also be quoted as examples of the distance vegetables can be carried for market. Our remotest English county, Cornwall, supplies us with many thousands of crates of these useful

vegetables, often in seasons when nearer fields have perished with the frost. I might mention incidentally that we have also of late years imported Cauliflower largely from Italy.

FORCED VEGETABLES.

Besides the efforts that have been made to improve and extend naturally grown vegetables, our more advanced market gardeners are turning their attention largely to forced goods.

The earlier climatic conditions on the other side of the English Channel, together with the increased facilities for transit of produce, have enabled the French competitor to secure great advantages over the English grower in the market for early spring salads and vegetables. Efforts are being made to minimise this by forcing certain vegetables in England, though up to the present the success has not been very marked. There are, however, a few things being very successfully done, and this may lead to more serious attempts in other directions.

RHUBARB.—The present system of forcing Rhubarb is a most marked advance on the old methods. There is a popular notion that the forced Rhubarb, so abundantly supplied to the London market from the Leeds district of Yorkshire, is in some mysterious way produced by waste factory steam. This is merely a humorous fable, as a visit to one of our local growers who are adopting its cultivation will clearly testify. A field of Rhubarb is first cultivated in the ordinary way. Large sheds, usually 100 ft. long, 30 ft. wide, 5 ft. high at the eaves, and 8 ft. high in the centre, are erected at a convenient spot, generally in the field or closely adjacent. These sheds are perfectly dark when closed, and the Rhubarb roots are lifted from the open ground and placed very thickly in these sheds, which are artificially heated and kept at the proper temperature and moisture. The Rhubarb is periodically pulled, bunched, and packed for market, and when the forcing season is over the roots can be removed and returned to the open ground for recuperation and future use. A shed of the size named will hold about an acre of Rhubarb, and the varieties grown are chiefly Champagne and Victoria. The season during which it is marketed extends from the latter end of January to May. In the height of the season—February and March—it is estimated that over thirty tons a day are brought into London alone.

SEA KALE AND ASPARAGUS.—These are now forced upon a new and greatly improved system, though the old practice of forcing Sea Kale is still being worked. By means of a subterranean chamber containing a hot pipe passing through an open water channel, the roots are supplied with a warm and humid bottom heat. Well-matured roots, raised in the open ground, are lifted and placed very thickly over this chamber in frames and protected from the outer air and light by suitable covering; and when the shoots are matured a delightfully clean blanched vegetable well rewards the grower for all his previous care and pains.

I may add that this system has been introduced by one of our most typical and enterprising market gardeners. With regard to Sea Kale, the bed will produce abundant sets for future out-of-door culture, yielding in time a further supply. With Asparagus, however, forced roots are of no further use. In all systems of forcing vegetables by packing such as I have described, a quantity of adjoining farm land is necessary to keep up a supply of well-grown roots.

MUSHROOMS.—The old system of forcing Mushrooms on triangular beds of manure with a straw protection is still largely followed. The attempts to force them in houses or sheds have met with very varying success. When well grown on the latter system they have a more attractive appearance; but to grow mushrooms successfully in a house requires constant watchful supervision, and experience often gained after much expense and comparative failure.

SALADS.—In the direction of forced salads and vegetables there is a large field for enterprise still open. Except Mustard and Cress, which are well and largely grown, and a few French Beans we are almost entirely in the hands of French growers for our early supply. I look hopefully to the time when cheaper agricultural glass-houses and frames shall enable British growers to compete successfully with foreign and Channel Island producers. At present English market gardeners find a more profitable use for frames by raising seeds in them and forwarding early out-of-door crops. As a rule vegetables thus assisted fetch much higher prices than later ones.

FRUITS—OPEN GROWN.

These are either orchard fruits or market garden fruits. The system of planting a mixed garden of top and bottom* fruits is generally followed. The bushes below can be removed later on, when the top fruits have grown sufficiently to cover the ground, and thus the garden be turned into an orchard; or the mixed garden can still be retained by thinning out some of the tall trees.

The bush system of culture does not admit of this dual arrangement after a few years.

There has been a great extension of fruit cultivation for market during the Victorian era, and particularly during the last half of it. During the last decade the acreage of fruit land has increased from 36,724 acres to 76,245 acres, of which 32,090 acres are orchards and 30,699 acres are market gardens. Besides this fruit land there are 96,696 acres of market gardens in Great Britain. I find that Kent is *par excellence* the greatest fruit and market garden county, and well deserves its title "the Garden of England." The leading market gardening counties are:—

	Acres of Fruit.	Acres of Market Gardens.
Kent	22,632	12,972
Middlesex	3,870	9,460
Worcester	3,194	6,139
Norfolk	2,943	2,834
Yorkshire	3,691	5,124
Hampshire	2,149	3,145
Essex	1,929	4,642
Cambridge	2,721	2,125
Surrey	1,459	3,700
Sussex	1,480	2,443
Lincoln	1,698	1,582
Bedford	264	7,997
Gloucester	1,743	2,277
Devon	1,533	1,613
Cornwall	1,948	2,101
Lanark (Scotland)	2,107	1,754

(" Bd. Ag. Ret." 1896.)

Respecting particular varieties of fruit grown for market there has been no doubt a greater improvement than in vegetables. The market gardeners are very largely the producers of their own seed in vegetables. In fruit they are more open to the introduction of new varieties from professional nurserymen,

* Top and bottom, *i.e.* standard trees with bushes planted between them.

especially so in new plantations, of which there have recently been so many. There are, however, cases where the possession of good varieties of market fruit have caused some of our market gardeners to raise their own stock, and occasionally to compete with nurserymen. Foreign competition in certain fruits has, of course, a considerable effect in determining the varieties produced by the home grower. The public taste, too, is another matter of consideration, especially in the introduction of new varieties. The main points to be studied in a new market plantation are (1) quantity or productiveness; (2) quality and appearance; (3) time at which it can be marketed.

APPLES.—Here the market gardener of to-day is brought face to face with the American producer. Consequently he must grow either—

(a) Early varieties to clear before the American crop arrives, such as Keswick Codlin, Lord Suffield, Lord Grosvenor, Devonshire Quarrenden, Yellow Ingestrie, Duchess' Favourite, Pearmain, Duchess of Oldenburg, Ecklinville, &c.; or

(b) Middle season apples of such well-known and favourite varieties that they are always saleable at good prices, despite all competition, such as King of the Pippins, Blenheim Orange, Cox's Orange, Ribston, &c.; or

(c) Late varieties, which can be kept till the bulk of the American crop is over, such as Bramley's Seedling, Lane's Prince Albert, Northern Greening, Wellington, &c.

PEARS.—Pears, like Apples, have greatly improved in variety, though only a few are grown in abundance for market work. Williams' Bon Chrétien is amongst Pears what Blenheim Orange is amongst Apples, and what Victoria is amongst Plums—undoubted favourite. The Hessel is largely grown as a sure cropper. Amongst other varieties I might mention Louise Bonne of Jersey, Marie Louise, Pitmaston Duchess, Calabasse, Fertility, Beurré Diel, Duchesse d'Angoulême, Seckle, Winter Nelis, and Catillac as being chiefly grown.

PLUMS have had many additions of late years, the chief favourite being appropriately named Victoria. Rivers' Early Prolific is a very valuable market Plum. Other varieties, such as Orleans, Prince of Wales, Green Gages, The Czar, Monarch, Diamond, Pond's Seedling, Gisborne's, Coe's Golden Drop, and Pershore, are largely grown. Plums from France are over before

our home-grown ones are ready, and the Dutch have not the quality of our English fruit.

CHERRIES are largely grown, particularly in Kent, where the cherry orchards are usually sold as a crop season by season. The chief market varieties are May Dukes, Eltons, Bigarreaus, and Morellos. The grower of Plums and Cherries has an object in securing early varieties, and with Plums late ones also, so as to avoid a glut as much as possible by lengthening the period for marketing.

SOFT FRUITS.—Strawberries, Raspberries, Currants, and Gooseberries. Of these, Strawberries come first in area and extent of cultivation. They vary much with the soil and situation, and are more subject to change of variety. The Cornish and Southampton fields have done much to drive French Strawberries out of the market, and the South-Western and Great Western Railways are assisting distant fruit growers. For flavour there is none equal to the British Queen, but its cultivation is more difficult. Paxton is by far the most largely grown market variety. President is a very useful old variety. Napier is too soft, and so is Noble, which, though of good size and prolific, lacks quality as a market fruit. Eleanor is late and sharp-flavoured. Royal Sovereign is perhaps the best of the newer varieties.

Bush fruits, as they are called, are very much more largely grown than formerly.

GOOSEBERRIES have a double advantage, there being a great demand for them in their green and unripened stage. Lads, Bobs, Warringtons, Industry, Ringer, and Rifleman are the chief market varieties.

CURRENTS, both red, black, and white, could with advantage be even more largely grown. They doubtless suffer somewhat from being often an undercrop.

RASPBERRIES are usually grown in the open field. They are a difficult fruit to handle except in tubs, and more Raspberries in proportion go to the jam factory than to market.

In some fruit districts local jam factories have been erected to deal with such surplus as cannot be more advantageously disposed of, particularly districts far from large towns, such as some parts of Kent, Worcestershire, Cambridgeshire, Gloucestershire, &c.

Besides our home-raised fruits there are enormous quantities of foreign imported fruits. In 1896 we received no less than 6,177,193 bushels of Apples from abroad, valued at £1,582,471; 483,823 bushels of Pears, valued at £206,674; 560,246 bushels of Plums, valued at £241,782; and 219,867 bushels of Cherries, valued at £105,246; and a total of 18,641,874 bushels of raw fruit, valued at £5,540,069, being an increase of £2,200,000 since 1871. With such facts before us can we wonder that English open-ground fruit culture is on the increase? Could we but depend with any certainty on our climate, I should say it was a great national waste that so much money should go out of the country to pay for what might profitably be grown within it. But unfortunately the English fruit crop is very uncertain, and many who might profitably engage in the business have not sufficient faith to inspire them with courage to make the attempt, or have not sufficient means to enable them to await the successful return for their outlay. Many instances could be cited of large returns in one year being followed by almost nothing another, and only by a system of averages can the value of a fruit farm be gauged. This uncertainty is very much against extended fruit culture.

The latest competitor with the home fruit grower has been California, the climate of which country seems most admirably adapted for choice high-class fruits. Mr. A. Block, of Santa Clara, is a very extensive fruit producer, and he has induced the railway and shipping companies to send fruit into London markets in cool chambers. He has perfected a system of packing for this purpose, and I have the pleasure of submitting to you for inspection a case of Doyenné du Comice Pears and a case of Coe's Late Red and Golden Drop Plums which started from California sixteen days ago, and were sold by thousands in the market by Messrs. Garcia & Jacobs yesterday. The fruit compares favourably with the choicest noblemen's gardeners' productions here to-day, and is an object lesson for English growers how to pack and forward to market. One great advantage of foreign fruit in the market is the fact that they are sold with the case complete, thus avoiding all the vexations and troubles attaching to returned empties.

FORCED FRUIT.

The cultivation of forced fruit for market has made enormous strides during the last twenty-five years. The small and comparatively trivial quantities grown in 1837 are now hardly worth considering. The few Pineapples and Grapes then grown were obtainable only by the wealthy, Cucumbers were grown in frames and pits, and Tomatos were unknown as food and popularly regarded as poisonous. No doubt the high prices realised by Grapes and Cucumbers led to their more extended cultivation, and the success attending these efforts, together with the more natural method of growing Cucumbers pendent, and the education of the public taste for Tomatos as food, has opened out the trade beyond all anticipation.

Other fruits forced are Strawberries, Peaches, Nectarines, Melons, and Figs. The introduction of Madeira Pineapples has caused their culture for market as an English hot-house crop to cease.

Many of our large fruit growers under glass also grow flowers, and by a judicious system of management reap considerable advantage from a succession of crops. As a rule, the most successful men engaged in this business have grown up in it. Having satisfied themselves of the soundness of its commercial character, they have applied their acquired experience in the practical details of their work to its extension. The enormously increased production has had the effect of greatly lowering the market values, and this has let in as buyers and consumers a large class, who thus obtain choice fruit at reasonable prices. This extension of trade has been made profitable by the cheapening of materials, and the more economic use of them by horticultural builders, and by improved systems in the construction and heating of greenhouses, and by more effective methods of carrying on the work on a large scale. Through these means the grower is enabled to face reduced prices with a fairly satisfactory result. One of our largest market gardeners thus sums matters up:—"I have to invest more capital, to employ more labour, and to work harder myself for less percentage of profit. The public reap all the additional advantage."

In visiting the establishment of any one of the large market gardeners we cannot but admire the excellent order and regular

system under which their business is conducted. Everywhere are visible the forethought and direction of a master mind, capable of grasping alike the most trivial details of the work as well as the highest commercial principles so necessary in organising and successfully conducting a large and important business.

A circle drawn with a fifteen-mile radius from Covent Garden will embrace the largest proportion of the market glass. Perhaps the Lea Valley contains the largest number of growers under glass. From Tottenham to Rye House there are a series of establishments which are monuments of progress; if the North of London be visited we find others in the Finchley district; if we journey up the Thames Valley and its outlets we again meet with many equally deserving, though more often hidden by the surrounding fruit plantations; the southern section stretches away to the Bexley and Swanley districts, where they bear equal evidence of importance as local industries. Besides this home district there are other neighbourhoods, such as Worthing, East Grinstead, Chelmsford, and many others, where colonies of fruit growers under glass are springing up and extending. In fact, wherever the soil and situation seem favourable to the successful development of this business some enterprising person seems ready to open it up.

I should particularly like to quote Worthing as a remarkable illustration of what a locality distant from large centres of consumption can accomplish. It is now about twenty-six years since the first commencement was made to produce glass-grown fruit at Worthing. It has now become a local industry of the highest importance. No fewer than 650 houses of glass are rated as agricultural land with a ratable value of £8,500 a year. They produce great quantities of Grapes, Tomatos, Cucumbers, and flowers; and the united efforts and association of the growers have literally compelled the railway to grant more favourable terms for the transit of goods.

I find it impossible to give accurate information respecting the quantities of goods raised under glass, but so far as I can judge there are about 1,000 tons of Grapes, 6,000 tons of Tomatos, and 500,000 dozen of Cucumbers produced in this country at the present time yearly. It is estimated that there are 32,000,000 square feet of glass in the United Kingdom used for fruit and flower culture. This would cover 735 acres of land, and if put

together end to end in houses, 15 feet wide, would reach a distance of 400 miles.

GRAPES.—The chief varieties of Grapes grown for market are Black Hambro', Gros Colmar, Alicante, and Muscat of Alexandria; and in smaller quantities Madresfield Court, Gros Maroc, and Canon Hall.

TOMATOS.—The old wrinkled variety has gone quite out of cultivation, and many growers select their own seed, chiefly from strains of Chemin Rouge, Perfection, Challenger, and Trophy.

CUCUMBERS.—The present system of growing Cucumbers in quantity has had the effect of almost entirely driving out the Early Dutch Cucumber from the market; and when the British public shall appreciate the value of this fruit as a stewed vegetable, as well as a raw salad, there will be an additional opening for its culture. Improved varieties for hot-house culture have followed the introduction of Telegraph and White Spine, and hybrid varieties raised therefrom now dominate the market. Many eminent growers are their own seed raisers. Instead of importing Cucumbers, there is now a considerable export trade in them to Continental cities. Our Grapes, too, are sent to the Continent and to America, proving at once the superiority of our hot-house fruit.

PEACHES and NECTARINES are grown in certain districts. Unless high-class fruits at top prices are produced, there does not appear to be very much profit attached to their culture. The Peach is especially liable to damage from imperfect packing and change of temperature, and no fruit shows such a difference in price between the first and second grades.

STRAWBERRIES under glass are a profitable crop when well grown, and they can be succeeded by a crop of Tomatos. In some cases a third crop of Chrysanthemums are grown in the same house.

FLOWERS—OPEN GROUND.

Large as have been the areas of agricultural land transferred from the farmer to the market gardener to supply vegetables and fruits, and great as has been the progress of those grown under glass, the crowning point of modern gardening is most certainly shown in the rise and progress of flower culture for market. There can be no comparison made between 1837 and

1897 in this branch of market work. The few loads of potted plants and bunches of flowers only obtainable at Covent Garden Centre Row, have been changed into the unique and magnificent spectacle presented by the early Covent Garden Flower Market of to-day. Nothing so much marks the advance of our working and middle classes in material progress, in improved taste and refinement, as their increased outlay upon flowers. At all seasons and under all conditions of life, from the sick-room in a London lodging, or the ward of a public hospital, up through all times of joy and sorrow, to the highest function of society (the Drawing Room), we find them shedding their joyous light and delicious perfume, Nature's most charming productions.

Naturally grown flowers commence with the humble Snow-drop, passing along with the changing seasons through Violets, Narcissus, Tulips, Wallflowers, Lilies, Pinks, Stocks, Roses, Asters, Dahlias, Chrysanthemums, and others, till frost and snow again appear. In early spring a large quantity of rooted plants and seedlings suited to suburban and window gardening are daily sold in pots and boxes. These are succeeded by bedding-out and window plants, such as Geraniums, Calceolarias, Marguerites, &c.

FORCED FLOWERS—POT PLANTS.

But however much we may admire our hardy and half-hardy bedding friends, whether in the plant or flower, they are eclipsed by their more delicate brethren of hot-house culture.

Pot plants (as distinct from cut-flowers) are of two classes: (1) foliage plants and (2) flowering plants.

FOLIAGE PLANTS have recently become more and more in demand, especially since our growers have proved that they can raise them without the assistance of foreign nurserymen. The Palms, for instance, have so increased in quantity and decreased in price as to bring them within reach of a multitude of buyers. The chief foliage plants brought to market are Palms, Ferns, Crotons, Aspidistras, Aralias, Solanums, &c. A curious fancy for small boxes of mixed foliage plants in thumb pots has sprung up of late years, and one firm alone sells about two and a half millions of these pots annually.

FLOWERING PLANTS in pots give general evidence of excellence of cultivation and magnificent training. They change

with the season much more than foliage plants do. The succession runs through Tulips, Hyacinths, Primulas, Cyclamen, Cinerarias, Spiræa, Deutzia, Musks, Mignonette, Marguerites, Heliotropes, Fuchsias, Calceolarias, Pelargoniums, Lilies, Ivy and other Geraniums, Heaths, Roses, Chrysanthemums, and many others. Some have a longer period than others, but all present in turn masses of colour, supremely grand at all seasons. The grower of plants for market is subject to fashionable caprice more than any other producer. Many flowers for almost unaccountable reasons have a run for a few seasons and then get somewhat discarded for newer favourites. As it takes some time to raise a stock of any newly fancied variety, this artificial rise and fall in value is very disheartening to growers. A faint idea of the extent of this important branch of market work may be gathered from the advertisement columns of the gardening press, where sales of hundreds of thousands of leading market varieties of young stock are quoted. In addition to the millions of pots brought into London, there is a very large trade carried on between the growers' places and distant centres of population, many thousand boxes being thus sent direct by rail every year.

CUT-FLOWERS.

Besides the enormous quantity of flowers and plants in pots grown for the market, there has sprung up of late years an increasing trade in cut-blooms. In point of fact, many growers are beginning to divert their attention from Plants to Cut-flowers, as entailing less work and expense with more certain sale. In this department, however, the local grower has to enter into competition, not only with the surplus cut-blooms of private growers and gentlemen's gardeners, but with more distant English market growers, who can send supplies of cut-blooms readily by rail, and also with the foreign producer, favoured with cheap rates and a more genial climate. From the Riviera, for instance, we have daily hundreds of baskets during the winter and spring months, and this trade is largely increasing. Doubtless there are times when this competing French flower trade has a considerable effect in cheapening certain classes of English goods. The choicest freshly cut home-grown flowers, however, secure the best class of trade, and in this as in fruit the English grower stands unrivalled.

As an instance of the remarkable effect of opening up a market with a remote locality I cannot but quote the Narcissus trade of the Scilly Islands. This was introduced by T. Algernon Dorrien Smith, Esq., of Tresco Abbey, who sent the first lot of flowers to Covent Garden in 1865, when they realised £1. Under this gentleman's fostering care and untiring efforts the export in 1885 had risen to sixty-five tons of flowers; in 1887 it had increased to 100 tons, and in 1896 to 496 tons of Narcissus and fifty-nine tons of Wallflowers and Tomatos. The largest day on record was this year, when 1,600 boxes came to London alone.

The Narcissus as a market flower affords a remarkable example of the way in which a popular favourite rapidly develops. Perhaps this is due, not only to its innate beauty as a flower, but to the time of year when it blooms, to its good keeping properties when properly gathered, and to the admirable and effective method of bunching for market. Great credit is due to those growers who so successfully introduced this popular flower.

The chief cut-blooms for market are Lilies of the Valley, Roses, Carnations, Scarlet Geraniums, Tuberoses, Arums, Camellias, Gardenias, Eucharis, Orchids, Chrysanthemums, &c. The great feature in connection with blooms is to secure a regular and constant supply. Of course this is impossible in certain cases, but there are others where it is done. These constant daily friends and old-established favourites are always in demand, particularly white and self-coloured varieties, and consequently are less subject to glut and its attendant evils. I might just add that one of our latest developments has been to keep Lily-of-the-Valley roots in cool chambers, so that they may be grown all the year round. It is impossible to give any statistics as to the quantity of cut-flowers or of the many thousands engaged in the trade as growers and sellers.

We have now reviewed the market gardener as a producer in all branches of his business, and shown the marvellous progress he has made, particularly during the last two decades. We have seen how he has extended the area of production in suitable districts, both near to and remote from the large centres of human life. We have seen how he has increased the variety and improved the quality of our food supply, and has added much to

the pleasures of life, as well as greatly cheapening both its necessities and its luxuries—and this in spite of enormous and increasing competition, both foreign and colonial. As a class the market gardeners of to-day may claim a high and meritorious standing amongst their fellow citizens, benefiting alike themselves, their employés, the many trades allied to their business, and last, but not least, the public generally. That the industry will still further advance there can be no doubt, and from a public point of view this is most desirable; but I would wish to add a word of caution in this respect.

The agricultural crisis through which we are still passing has been not only due to the decrease in the value of produce brought about by enormous foreign importations, but it was also partly caused by the fictitious value attached to farms through the competition of retired mercantile men and other capitalists, who regarded farming as a healthy, profitable, and a pleasurable investment for capital. I have seen signs of a similar feeling with reference to market gardening, and particularly to cultivation under glass, and though I still believe there is room for further judicious extension by competent practical men, I feel it a duty to advise a cautious policy, and, above all, a thorough business acquaintance with the details of this work, before rashly venturing upon outlay which may bring trouble and loss, instead of pleasure and profit.

I have seen at the Victoria Era Exhibition some very interesting illustrated comparisons showing the differences between things as they exist to-day and as they were sixty years ago. I regret I have no diagram of this description to offer you, but I am much indebted to Mr. Tucker for some very excellent enlarged photographs of a few of the best of his many horticultural erections for market garden produce, which will give you a better notion of the progress the trade has made than any mere words of mine.

If I might venture on a comparison between our market gardening operations in 1837 and 1897, I would say, Compare this huge palace of glass in which we are assembled and its outlying grounds with the small conservatory and vinery in the garden of a retired suburban amateur, and you will not be very far out in the contrast. I beg, in conclusion, to thank the kind practical friends connected with the market trade without whose valuable

assistance it would have been impossible for me to have responded to the wish of your Society by reading this paper to-day.

DISCUSSION.

Mr. ROUPELL expressed the pleasure with which he had listened to the paper. He considered its grasp something wonderful. It gave evidence of very great research. There was, however, one omission, and that was, the paper contained no allusion to the invasion from the Antipodes. Tasmania and the other Australasian colonies were preparing to extend their cultivation of fruit, and a list had already been supplied of what the former country was able to do. He had had from the colony of Victoria a very handsome offer if he could introduce to the colony a good dessert Apple which could be put on the London market early. He had suggested one or two names, but our early varieties were not adapted for keeping. The sample sent out should be a good early Apple, and most pleasant to eat when taken from the tree. It should therefore be an Apple with some of the character of the King of Pippins, or the new Allington Pippin, that would meet the want. He was convinced that the supply of a good Apple created a demand, and that people when they had been accustomed to pay 4*d.* and 6*d.* a lb. for good Australian fruit would not hesitate to pay a better price than they had been in the habit of paying for good English fruit later in the season. For that reason he should look with hope rather than despair to the prospect of our having Australia to compete with us. He was sometimes amused by the remarks made by amateurs and gardeners in the horticultural press as to the high quality of their produce. He wished those writers could pay a visit to the establishments of Messrs. Kay, Ladds, or Rochford. Such a visit would take the conceit out of them. He had visited the establishment of Mr. Peter Kay, and was astonished at the Grapes, the bunches being as big as horses' heads. He thought the Royal Horticultural Society might yet do a great deal for market growers by encouraging them and giving facilities for exhibiting their produce at the fortnightly and annual Shows.

Mr. GEORGE BUNYARD, V.M.H., said Mr. Assbee had advised a large increase in the plantation of Currants. Unfortunately during the last few years a dire calamity had seized the Black

Currants, and the mite *Phytoptus* had increased to such an enormous extent that large plantations had to be entirely given up. Red Currants were no doubt very useful, but the importation of a large quantity of cheap wines had almost done away with that old English beverage the Currant-wine. With regard to the black Currant, the trouble was that they had not been able to find anything that would kill the mite without killing the trees. As much young wood as possible should be kept on the plant. Much discredit had been cast upon this wonderful industry of fruit-growing by amateurs and others, who made grievous mistakes in their methods of treatment, and did not forget to air their opinions in the gardening and daily papers. There was no risk if people would take a wise view of the question. A man should not put all his eggs in one basket, and he would find his profits remunerative. A good haul should not be expected every year. He suggested that farmers and fruit growers should combine more than they did for mutual protection and mutual benefit in fighting the excessive competition on the part of Continental growers. As to Peaches, there was no doubt that the large sizes would always command fine prices; but they should be sent to market in the best condition, and it would pay any grower better to keep his rubbish at home than put it upon any market.

Mr. ASSBEE, replying, said that the subject of the supply of foreign and colonial market garden produce and its effect upon the English market was much too large a one to be treated except incidentally in the paper of to-day. New fields in distant countries were being continually opened up, but these competed more with each other in many respects than with British growers. Jamaica, for instance, had recently entered the field with Oranges and Bananas. The Californian trade, to which allusion had been made and products exhibited on the table, was, like the American and Canadian Apple trade, likely if largely developed to have a very considerable influence on home-grown fruit. With regard to Antipodean fruit, it was a welcome addition to English markets, as its season of ripening was the reverse of our own, and any importations which tended to a continuous yearly business of the same kind had an advantage over others which created a glut at one time to be succeeded by a scarcity at another.

THE HOUSE SPARROW.

(Passer domesticus, Linnæus.)

By Miss ELEANOR A. ORMEROD, F.E.S., and Mr. W. B.
TEGETMEIER, M.B.O.U.

THE sparrow question is one which is still constantly recurring, as it has done for many years, and as it will continue to do, until reliable evidence of the nature of the bird's food is more accessible for general information than it is at present in this country. The mischief that is done by the sparrows is easily observable, but excepting in connection with these noticeable devastations the nature of their food (meaning by this what the adult birds feed on throughout the year, and what the nestlings are fed on) is far from having been as well brought forward as is desirable, and the published records of as much as we know (whether for or against *Passer domesticus*) are neither as well before the public, nor as accessible to those practically concerned, as it would be well for them to be.

When, consequent on the very ill-advised introduction by private enterprise of this bird into the United States of America, serious and widespread losses occurred from its destructive habits, an investigation into the nature of its food was set on foot under the direction of the U.S. Board of Agriculture by examination of the contents of many hundreds of sparrows. These were submitted for identification to qualified members of the Ornithological Division, with final reference to Dr. C. V. Riley, the Entomologist of the Department, and the results were recorded both as to absence and presence of insects, and (where insects were present) their names and the orders to which they belonged were given, together with information as to whether they were of habits helpful or hurtful to the agriculturist, or, as far as was known, neither the one nor the other; and these observations were published.* In this country we have also good work on the subject, including observations and examinations made by known agriculturists, ornithologists, and other qualified investigators, comprising

* "The Insectivorous Habits of the English Sparrow." By C. V. Riley, Ph.D. [Extracted from "Bulletin No. I., Div. Ornithology and Mammalogy, U.S. Dept. of Agriculture," entitled "The English Sparrow in America."]

records of contents of very many hundred sparrows, and notes of the results of the absence or presence of the bird in various localities, and for various lengths of time, up to as much as fifteen consecutive years or more. Some of these records are given in this paper, in the hope of making them more generally accessible, and that further observations, also undertaken by properly qualified hands, may help to sound views on this important subject.

The most detailed account that is generally accessible of the food of the house sparrow during each month of the year in England is that given by the ornithologist, M. J. H. Gurney, of Keswick Hall, near Norwich.* The table from which the following information was prepared shows the contents of the stomachs of 694 house sparrows. The dissections were made by twelve or more qualified observers in various places, at regular intervals throughout the whole year, the observations being recorded under the heads of "Customary Food" and "Occasional Food."

FOOD OF ADULT SPARROWS.

JANUARY. *Customary food*.—Corn from stacks and poultry-yards; seeds of all kinds. *Occasional food*.—Refuse corn, maize, and capsules of moss.

FEBRUARY. *Customary food*.—Corn from stacks and poultry-yards. *Occasional food*.—Seeds; buds of gooseberries.†

MARCH. *Customary food*.—Corn, wherever they can get it. *Occasional food*.—Young tops of peas, radish, cabbage, and cauliflower; seeds, freshly sown barley, and oats.

APRIL. *Customary food*.—Corn; vegetable matter. *Occasional food*.—Freshly sown barley, and oats; oblong green seeds, not identified; caterpillars.

MAY. *Customary food*.—Corn; vegetable matter; seeds. *Occasional food*.—Young pea-pods and leaves of peas; gooseberry blossoms and young gooseberries; small beetles; caterpillars of the brimstone moth, and white cabbage butterflies;

* See "The House Sparrow." Messrs. W. Wesley & Son, 28 Essex Street, Strand, London. Pp. 11-17.

† During January and February (1898) the gooseberries at Chiswick have been entirely devastated by sparrows, and hardly had they finished the gooseberries than they at once began on the plum blossom buds.

turnip seed ; hay seed ; sprouts of young barley half an inch long ; pollen of the sycamore and apple ; mangold leaves.

JUNE. *Customary food*.—Corn ; vegetable matter ; seeds of various sorts ; peas. *Occasional food*.—Gooseberries and other fruit ; lettuces ; small beetles ; mangold leaves.

JULY. *Customary food*.—Young wheat, barley, and oats ; vegetable matter ; seeds of various weeds. *Occasional food*.—Peas ; small beetles ; beans ; seeds of wild spinach.

AUGUST. *Customary food*.—Wheat, barley, oats. *Occasional food*.—Seeds of corn, bindweed, knotgrass, &c. ; aphides, small beetles, daddy-longlegs (*Tipula*), caterpillars of *Teras contaminana*, moth of *Crambus culmellus*.

SEPTEMBER. *Customary food*.—Corn ; seeds of many kinds, especially the knotgrass, and corn bindweed. *Occasional food*.—Caterpillars ; berries ; seeds of plantain.

OCTOBER. *Customary food*.—Grain, some of it refuse grain ; seeds of many kinds, including knotgrass. *Occasional food* not recorded.

NOVEMBER. *Customary food*.—Grain, seeds of plants. *Occasional food*.—Newly sown seeds of wheat ; small caterpillars.

DECEMBER. *Customary food*.—Grain, principally from stacks. *Occasional food*.—Seeds, maize, sprouting beans.

FOOD OF YOUNG SPARROWS TO THE TIME OF LEAVING THE NEST.

MAY. *Customary food*.—Grains of last year's corn ; small beetles ; caterpillars. *Occasional food*.—Buds ; red spider ; hair-worms ; small flies.

JUNE. *Customary food*.—Caterpillars of various kinds, up to three-quarters of an inch in length ; young wheat. *Occasional food*.—Beetles, large brown cabbage moth, wireworm.

JULY. *Customary food*.—Caterpillars ; beetles ; soft milky grains of wheat and barley. *Occasional food*.—Bluebottle-flies.

AUGUST. *Customary food*.—Caterpillars ; beetles ; young corn. *Occasional food*.—Small chrysalids.

To the above records Mr. Gurney added the following summary :—" It may be said that about 75 per cent. of an adult sparrow's food during its life is corn of some kind. The remain-

ing 25 per cent. may be roughly divided as follows:—Seeds of weeds, 10 per cent.; green peas, 4 per cent.; beetles, 3 per cent.; caterpillars, 2 per cent.; insects which fly, 1 per cent.; other things, 5 per cent. In young sparrows not more than 40 per cent. is corn; while about 40 per cent. consists of caterpillars, and 10 per cent. of small beetles.” . . . “Sparrows should be killed for dissection in the afternoon.” . . . “If the sparrows are caught at night, they have digested their food in a great measure.”

Some amount of good is noted by Mr. Gurney as done by sparrows feeding (in conjunction with other little birds) on seeds of various kinds of weeds, but the extent of benefit received in this way varies greatly according to local circumstances. In Hardwicke's “Science Gossip,” 1883 (p. 217), Mr. A. Willis, of Sandas, is noted as having made a series of examinations of sparrows' stomachs in 1882, and in eighty-seven of these insects were found in only eight instances. In an exhibition, by Dr. Edwards Crisp, of 100 stomachs of young sparrows, before the British Association at Birmingham in 1865, not 5 per cent. of them contained insect food. Mr. John Cordeaux opened the crops of thirty-five young sparrows of various ages, and on an average found two parts of soft grain and one part of insects.

The observations of Colonel Champion Russell, of Stubbers, near Romford, Essex, record the examination of the contents of the stomachs of sparrows shot over a wide extent of country during fifteen years.* The following are extracts from Col. Russell's remarks:—“The food in the old ones was almost all corn during the whole year; green peas were also found in them in summer; and in May and June, when corn is scarce, a few wild seeds, chiefly of grass. No insect has been found by me in a sparrow between September and March. I have not often found one at any season (particularly between June and March) in a sparrow old enough to feed itself, and have very seldom found any number of insects in one, even when corn could scarcely be got.”

The following remarks bear on a very important phase of sparrow feeding. Colonel Russell observed:—“To prove that sparrows are really useful, it is not enough to show that they destroy some injurious insects, but it must also be proved that

* See “The House Sparrow” (Wesley & Son), pp. 22-24.

in their absence other birds would not destroy them at least as effectually. This can be found out only in one way, by banishing the sparrows from a place for some years." This Col. Russell did, his place being a fair specimen of the country, that is, having flower and kitchen gardens, shrubberies, orchard surrounded by meadows, with cornfields all round; and all birds excepting sparrows were let alone. The result was that after the almost total absence of sparrows from his garden for many years everything seemed to do better than elsewhere, many things much better. Young peas needed no protection from birds; green peas were not picked out of the pods (excepting one year in the fifteen, when some other birds devoured the late peas), and the gooseberry buds were not picked out.

In regard to special examination, Col. Russell noted:—"Fifty old sparrows, and sparrows which could feed themselves, were killed one summer about my buildings and garden with food in their crops. This food, carefully examined (as in all cases, with a lens), was found to be corn, milky, green, and ripe; and sometimes green peas from my garden. Only two small insects were found in the whole number. The food in them has been much the same every year."

"On the whole, the deduction from the food-test during fifteen years seems to be that the sparrows are useless, and that the insects which would be given to their young by them, if they were allowed to live in numbers about my premises, would be so much food taken, when they most want it, from better birds which live entirely, or nearly so, on insects, and thus keep them, especially caterpillars, down so effectively in the absence of sparrows that, when a chance pair of these come and build, there are few of their favourite sorts for them."

The above paragraph is inserted in italics on account of its importance as the result of fifty years' observation of sparrow life, to which, during fifteen years, examination of their contents was added—this by a landed proprietor in a locality well suited for observation, and so well known for his trustworthy researches that he was examined on the Wild Birds Parliamentary Committee—and his records, together with those of Mr. Gurney and two other observers, are officially noted by the U.S. Department of Agriculture as "an important European work to be mentioned in connection with 'the house sparrow.'"

Much of Col. Russell's collection of contents of sparrows was long preserved in spirit or preservative medium, in small glass jars, and clearly proved the enormous proportion of wheat grains they contained.

With regard to detailed account of amount and nature of the insect contents found in stomachs of sparrows, the official account of the U.S. Board of Agriculture, prepared under the direction and verification of Dr. C. V. Riley, Entomologist to the Department, gives the fullest information of any we are aware of up to date.* This report is based on examination of stomach-contents of 522 sparrows by Dr. Hart Merriam, Ornithologist to the U.S. Department of Agriculture. Of these, which were examined in the Ornithological Division, *ninety-two alone were found to contain insects*. By stomach-contents is included not only what is taken from the crop, but also that taken from the gullet and the mouth. Of the above 522 stomachs, 338 of birds killed on ground (avoiding roads) near Washington were in many cases examined within an hour or two after death; the remaining 184 were sent to Washington in alcohol.

The report gives first a list of the specimens containing insects, giving age of sparrow (as adult or young); also sex, date of death, locality where killed, and name of insects found. This is followed by a very important section, which we much need similar details of here, namely, the "habits of the insects concerned." In this the insects found are classed under heading of the scientific names of the orders to which they belong, as whether beetles, flies, moths, and butterflies, or others; with notes of their life-history or habits where known, so that it can be told whether the insect is injurious or helpful; as, for instance, in the case of a species of *Tiphia*, of which one kind destroys grubs of May-beetles, and *Myzine sexcincta*, of similar habits; of the first of which remains occur in ten stomachs; of the second, in thirty. Also notes are given of presence, presumably unimportant, of kinds of which little but the name is known. All of the principal orders of insects were represented, namely, *Hymenoptera*, that is, bees, ants, parasite wasps, &c., in 59

* See "Insectivorous Habits of the English Sparrow (*Passer domesticus*)."
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stomachs; *Coleoptera*, beetles, in 53; *Orthoptera*, locusts, &c., in 9; *Lepidoptera*, as moths and butterflies, in 8; *Hemiptera*, as plant-bugs, &c., in 6; *Neuroptera*, as (in this case) some stone-flies, and Psoci, in 3; and *Diptera*, as blue-bottle and house-flies, in 2. Besides these, *Arachnidæ*, as spiders or parts of spiders, or spider allies, were found in 7 stomachs.

Most of the insects noted were in developed, that is, complete, not larval or pupal condition; and it is mentioned in the summary that the insects taken from the sparrows were mostly of harmless species. Attention is also drawn to the fact that during the year in which most of the birds were shot at Washington, the shade-trees there were suffering from insect infestation; and of the four different species infesting, *only two specimens of one kind* were found in the sparrows' stomachs investigated.

Many other records of observation, both American and British, are given in the "Bulletin," and one of the concluding sentences of Dr. Riley's report is:—"Finally the examinations taken as a whole show how thoroughly graminivorous or vegetarian the sparrow is as a rule."

At the meeting on April 21, 1885, at Washington, of the Council of the American Ornithologists' Union, the Committee rendered its final report of considerations as to the serviceableness or otherwise of the English sparrow, these being based on information received in reply to their circulars of inquiries sent to localities of the entire United States and Canada.* The report, which contains a great amount of solid information, is too long for insertion here; but relatively to the points now under consideration, the united "verdict of the ornithologists," formally given, is "that there is an overwhelming mass of testimony to the effect that the sparrow drives away certain of our most valued species of native birds"; and in reply to the question on the circular, "Is it an insect-eater or a seed-eater?" that every reply to this question, *based on dissection*, agrees in attributing to this bird a diet almost wholly vegetable.

* For report given in full, see "Forest and Stream" for Aug. 6, 1885 ("Forest and Stream" Publishing Company, 39 Park Row, New York, U.S.A.)

Lists and Observations of Birds which destroy Crop and Orchard Insects in England, and Notes of the lessening of the number of wholly insectivorous Birds by Sparrow attack.

In our country we have much trustworthy observation of damage from sparrows driving away the truly insectivorous birds, notably swallows and martins. From my own personal observations, I can speak of martins, which built plentifully under eaves, being driven off, so that nesting ceased consequent on increased sparrow presence; and the following notes are from observations sent to myself (E. A. O.).

In 1887 I received an observation* from Colonel Champion Russell, of Baldwins, and Stubbers, near Romford, Essex, of the presence of sparrows in droves or thousands at the first named place, where they had not been kept in check, but *not* of martins; whilst at Stubbers, about a mile off, where Colonel Champion Russell had kept the sparrows in check for many years, there was presence of martins in hundreds.

At another locality—The Moat House, Leake, near Boston, Lincs.—where the insects were “a serious pest,” the occupant took my advice and pretty well destroyed the sparrows; consequently swallows and martins re-established themselves, and the pest of insects ceased to be destructive in garden and orchard. Mr. Christy, of Boyton Hall, Chelmsford, reported to the same effect, that as soon as the swallows and martins had built their nests the sparrows drove them off, and laid their own eggs in the harried nests, and “as a consequence we swarm with all kinds of noxious gnats and flies.”

In reply to an inquiry I wrote to Mr. J. H. Gurney, of Keswick Hall, near Norwich. As a skilled ornithologist, he mentioned that he could testify from personal observation that the sparrows drive away the martins, and that he considered the undoubted decrease of this species in the British Isles to be due to their being prevented from nesting by the sparrows.

In regard to what bird-help we may look to for ridding us of insect enemies in the absence of the sparrow, the question may be satisfactorily answered by reference to our various excellent

* For this and the three following observations, see the “Twelfth Annual Report on Injurious Insects,” pp. 99, 100. Simpkin, Marshall & Co., Stationers’ Hall Court, London, E.C. Price 1s. 6d.

standard works on British birds; but for practical purposes the following notes, for which I was indebted to Mr. F. Norgate, of Sparham, near Norwich (who has devoted particular attention to the subject), give some useful points.

Amongst various kinds of birds serviceable generally on forest trees, apple trees, and fruit bushes, Mr. Norgate mentions the titmice, including the blue, cole, marsh, long-tailed, and great tit (and of these the blue tit may be especially observed at work amongst aphides on gooseberry bushes); also the warblers, woodpeckers, nuthatch, and tree-creepers. The lesser spotted woodpecker is noted as especially frequenting the apple; the gold-crested regulus frequents the Scotch pine, spruce, and other *Coniferae*; the bearded tit, yellow wagtail, titlark, wren, cuckoo, and water rail are mentioned as serviceable in osier-beds and reeds, and in marsh-hay. Amongst gooseberry, currant, and raspberry bushes the titmice and warblers, the wren and the cuckoo, are noticed as of especial use.

Amongst cabbage and turnip crops the partridge, spotted flycatcher, swifts, swallows, and martins are of use; and on grass (besides the warblers, swallows, swifts, martins, and partridge before mentioned) the wagtails, pipits, and starlings are all serviceable. The cuckoo is of especial service as eating *hairy* larvæ, and the flycatcher as destroying white butterflies.

During the twenty years in which I have received notes from agriculturists on measures of prevention of insect attacks, many other kinds of birds have been mentioned as serviceable, and especially the rook (when not in such overwhelming numbers as to do as much harm to the crop in their work of extirpation as the insects); and in connection with the great attack of antler moth in the South of Scotland in 1894, I had observations from one district of the stomachs of the snow buntings being full of the caterpillars in the winter.

In the case of the disastrous infestation of diamond-back moth in 1891, in reply to my official request for information as to what birds were observed as helpful in clearing the caterpillars from the infested turnip and cabbage leafage, I received notes of presence of the following kinds:—Rooks, crows, seagulls, peewits, grey plovers, green or golden plovers, starlings, linnets, green linnets or greenfinches, chaffinches, and yellow-hammers. But amongst all the returns sent me, which

ranged along a wide band of country from Dover to Aberdeen, I only find three replies favourable to sparrow help, and one of these couched in doubtful language. On the other side, it was mentioned that the sparrows were occupied with early oats, and had no time to spare for caterpillars; also the sparrows and smaller birds preferred the barley; and that the sparrows were too numerous, and were against the swallows.* (E. A. O.)

The above notes are only brought forward to show that, independently of the sparrow (which is often brought forward as if our safety from insect ravage lay in the keeping of this one species), we are excellently supplied with a watchful and efficient bird-police, able and willing to take the insect robbers of our orchards and gardens in charge, and helpful, without raising undue levies for the supply of overwhelmingly increasing progeny, and without dispossessing far better tenants from their houses.

The rapid rate of increase of the sparrow is one of the reasons why protection places us in such a difficult position in saving our crops from its ravage. One pair of these birds frequently produces nearly twenty young ones in the season, three nests with five or six eggs in each being stated to be not unusual; and a very little calculation will show that in a few years, where no disaster betides them, the progeny of *one single pair will amount to millions*, as evidenced by the rapidity with which the small number imported have spread over the United States, Australia, and New Zealand.

We have *evidence* of the broad-scale losses caused by introduction of the sparrow, in the devastations brought about by its introduction into the United States, Canada, and Australia; and we have *evidence* in our own country of the saving of crops and restoration of helpful birds by systematic destruction of this one kind; but we have no *reliable* records of injurious effects being caused by enforced banishment or destruction of the sparrow.

For many years mention has been made, by those who consider sparrow preservation desirable, of great disasters following on some not clearly detailed methods of extermination or ex-

* Injury by sparrow devastation is a constantly recurring matter brought before me, and by way of one special observation I had a record in 1884 from Mr. Gaskell, then Secretary of the Wirral Farmers' Club, Birkenhead, that "the judges of our farm crops estimated the damage done by sparrows to be one-third in some districts they judged crops in."

pulsion of the sparrow in the countries of Hungary and Baden, and also in the territory of Prussia ; and, nearer our own time, in Maine, and near Auxerre in France.

With regard to the three first named, a record will be found in *The Times* newspaper for August 21, 1861. This gives a translation from the French paper, the *Moniteur*, of a report on four petitions relating to preservation of small birds, which had been presented to the French Corps Législatif. The report contains much information, but in respect to the emigrations of the sparrow because the bird was aware of the plots that were being laid against its safety, the statements cannot be said to carry any weight. The following extract is inserted, as it is important to agriculturists to have a correct copy of the baseless statements they are sometimes called on to believe. The passage is as follows:—"Now, if the facts mentioned in the petitions are exact, according to the opinion of many this bird ought to stand much higher than he is reputed. In fact, it is stated that a price having been set upon his head in Hungary and Baden, the intelligent *proscrit* left those countries ; but it was soon discovered that he alone could manfully contend against the cockroaches and the thousand winged insects of the lowlands, and the very men who offered a price for his destruction offered a still higher price to introduce him again into the country. . . . Frederick the Great had also declared war against the sparrows, which did not respect his favourite fruit the cherry. Naturally the sparrows could not pretend to resist the conqueror of Austria, and they emigrated ; but in two years not only were there no more cherries, but scarcely any other sort of fruit—the caterpillars ate them all up—and the great victor on so many fields of battle was happy to sign peace at the cost of a few cherries with the reconciliated sparrows."

With regard to the destruction and consequent results stated to have occurred in Maine and near Auxerre, at present our very best endeavours have failed to find that the statement of this having occurred rests on any authoritative basis ; and the only definite notice of the subject which we have found is that in the neighbourhood of Auxerre there was an injudicious destruction of *small birds generally*, and not only of *Passer domesticus*.*

* See "The House Sparrow at Home and Abroad," by Thomas G. Gentry, p. 26. Philadelphia, 1878.

SUMMARY.

In the present space it is impossible to enter fully on this important national matter, but still we find, in addition to what all concerned know too well already of the direct and obvious losses from sparrow marauding, that there is evidence of the injurious extent to which they drive off other birds, as the swallows and martins, which are much more helpful on account of their being wholly insectivorous; also that, so far from the sparrow's food being wholly of insects at any time of the year, even in the young sparrows only half has been found to be composed of insects; and of the food of the adults, it was found from examination that in a large proportion of instances no insects at all were present, and of these many were of kinds that are helpful to us or harmless. Also it is well on record that there are many kinds of birds which help us greatly by devouring insects, and that where sparrows have systematically been destroyed for a long course of years all have fared better for their absence; and also attention should be drawn to the enormous powers of increase of this bird, which under not only protection, but to some extent absolute fostering, raises its numbers so disproportionately as to destroy the natural balance.

Here as yet we have no movement beyond our own attempts to preserve ourselves, so far as we legally may, from sparrow devastations; but in the United States of America (on the evidence of which we have given a part) the Association of the American Ornithologists gave their collective recommendation that all existing laws protecting the sparrow should be repealed, and bounties offered for its destruction; and the law protecting the sparrow has been repealed in Massachusetts and Michigan. Dr. Hart Merriam, the Ornithologist of the U.S. Board of Agriculture, also officially recommended immediate repeal of all laws affording protection to the English sparrow, and enactment of laws making it penal to shelter or harbour it; and Professor C. V. Riley, Entomologist to the Department, similarly conveyed his views officially as to it being a destructive bird, worthless as an insect killer.

In Canada, on October 6, 1888, at the annual meeting of the Entomological Society of Ontario, Mr. J. Fletcher, Entomologist of the Experimental Farms of the Department, strongly advocated the destruction of the sparrow; and, in reply to the

Hon. C. W. Drury, Minister of Agriculture (who attended the meeting as head of the Agricultural Department of Ontario), stated "that this destructive bird was no longer under the protection of the Act of Parliament respecting insectivorous birds, and that everyone was at liberty to aid in reducing its numbers."

Reasoning on the same grounds as to procedure in this country, we believe that similar action is, without any reasonable cause for doubt, called for here. The amount of the national loss, by reason of ravaged crops and serviceable birds driven away, may be estimated, without fear of exaggeration, at from one to two millions a year.

We do not pretend to offer suggestions as to what may be considered fitting to do by Government authority, but much of their own protection lies in the hands of farmers and gardeners themselves; and sparrow clubs, well worked, and always bearing in mind that it is *only this one bird* that is earnestly recommended to their attention, would probably lessen the load to a bearable amount; and we believe that subscriptions, whether local or from those who know the desirableness of aiding in the work of endeavouring to save the bread of the people from these feathered robbers, would be money wisely and worthily spent.

ON TOMATO CULTIVATION.

A Paper based on Experiments carried out at the Cheshire Agricultural and Horticultural School, Holmes Chapel, in 1896 and 1897.

By Mr. W. NEILD, F.R.H.S.

TOMATOS have been grown in this country for a period of more than 300 years, but it is only in comparatively recent years that the public have begun to appreciate them. In former years it was only in large gardens that they were grown, and they were then used for soups and sauces. At the present time the taste for them has undergone a complete change, and, instead of their consumption being restricted to the affluent, they are eaten by nearly everyone. To meet the increasing demand for good fruit some of the large growers for market have covered acres of land with glass erections, and each year these are being added to; yet with all these, and the surplus from private

gardens, the supply of home-grown fruit is insufficient to meet the growing demand. Large quantities are imported from the Channel Islands in summer, and from the Canary Islands during the winter months. If a sufficient quantity of home-grown fruit could be obtained, there is no doubt whatever it would be eaten in preference to that which is imported, because it is incomparably better.

Tomatos are amongst the most easily grown and accommodating plants in cultivation; but in order to obtain the maximum amount of fruit that they are capable of producing their requirements must be thoroughly understood and carefully attended to. The grower who can devote a house exclusively to them is in a much better position for obtaining the best possible results than one who has to grow them in houses in which there is a mixed collection of plants. During the summer months a supply may be obtained from plants grown in the greenhouse or plant-house after the majority of the legitimate occupants are placed outside.

A fair measure of success may be obtained by growing them in ordinary garden frames. The frames should have a sharp pitch towards the south, in order to obtain as much sunshine as possible. A narrow ridge of soil, eight inches deep and the same in width, should be placed along the inside front of the frame. The plants should be put in one foot apart, and confined to a single stem: these should be supported on laths or wires stretched from end to end of the frame at about eight inches below the glass and the same distance apart.

For a period of from three to four months—commencing at the end of May—Tomatos will grow most luxuriantly outside, and many of the smaller fruited varieties will set their fruit very freely in this part of Cheshire, but comparatively few fruits attain maturity. Unless the green fruit can be used for home consumption, it is comparatively worthless, as at present it is not a marketable commodity.

METHOD OF CULTIVATION.

To provide an early summer supply, the seed should be sown towards the end of November. Use well-drained pots or boxes, filled to within one inch of the top with a compost of loam, leaf soil, and sand in equal proportions. The compost

should be broken up finely, so as to prevent injury as much as possible to the young and tender roots when transferring them to small pots. The seeds should be sown about half an inch apart, and thinly covered with soil. If the soil is inclined to dryness, it would be better to water it before sowing rather than afterwards. A sheet of glass placed on top of the seed pot or box will prevent the depredations of vermin, and keep the soil in a uniformly moist condition. A temperature of from 60° to 65° Fahr. will be suitable for the germination of the seeds. When the seedlings are well above the soil, they should be placed close to the glass to prevent them becoming drawn up and weakly. When they have made three or four rough leaves, they should be carefully removed from the seed pots, and placed singly in small pots. It is advisable to cover the stem right up to the cotyledons, or seed leaves, to induce the formation of roots that will afterwards contribute to form a healthy, vigorous plant. From pots 2½ inches in diameter they may be transferred to others 5 inches across, and subsequently into 10-inch pots, which are quite large enough to support a good crop of fruit, or they may be planted out in a prepared border of soil. Under no circumstances is it advisable to allow the plants to become root-bound before they are placed in their fruiting quarters.

All of our plants, both in 1896 and 1897, were grown singly in pots 10 inches in diameter. The mould used in the fruiting pots was of a heavy and adhesive description. It was taken from a pasture field, and was stacked for a few months previous to using, in order to destroy the vitality of the grasses and other indigenous plants growing upon it. Nothing was added to the soil at the final potting with the exception of a small quantity of lime rubble, for supplying food to the plants, and to prevent the soil from becoming too adhesive. The pots were efficiently drained to allow the superfluous water to pass away freely. When the plants are well established in the fruiting pots, and have a large expanse of foliage, they require a copious supply of water to take the place of that which is dispersed by the evaporation from the soil and by transpiration from the leaves; therefore it is necessary that provision should be made to allow surplus water to escape, otherwise it would cause the soil to become sour and inert; a condition that would be detrimental to the health of the plants. Growers should be very

careful to note whether the soil is dry before applying water. In spring and early summer the young and tender shoots and leaves flag or droop under the influence of strong sunshine, especially after a period of dull weather, although the soil in which they are growing may be sufficiently wet. It is under such conditions that the inexperienced seriously injure their plants by watering them, under the mistaken impression that the drooping is brought about by dryness at the root, whereas it is caused by the transpiration of water from the leaves being greater than the roots can supply.

The plants were restricted to one main stem; all the laterals or side shoots were removed when they were quite small. A heavier and more regular crop of fruit can be obtained by this system than by any other. The main leaves were not cut or mutilated in any way so long as they remained in a healthy condition. The far too common practice of almost defoliating the plants cannot be too strongly condemned, as it has an injurious effect upon the yield and quality of the fruit. The plants were grown in houses recently planted with vines and Peaches. Many of them were trained to the back wall at a considerable distance from the glass. Had they been grown in houses specially constructed, and devoted entirely to them, there is every reason to suppose that a heavier crop would have been obtained. In 1896 an attack of Potato disease (*Phytophthora infestans*) made its appearance early in May on the Hackwood Park variety. The plants were sprayed with a solution of $\frac{1}{2}$ lb. sulphate of copper and $\frac{1}{2}$ lb. quicklime mixed in 10 gallons of water, which removed all traces of disease in the later fruits.

YIELD, VALUE, AND VARIETIES.

The plants grown in 1896 were raised from seed sown in the previous December, and the first ripe fruits were gathered on the following May 4. The average yield was over $8\frac{1}{2}$ lbs. per plant, the total yield of fruit from 130 plants was 1,127 lbs. The price varied from 6d. to 1s. per lb. The total amount realised, after payment of carriage and commission, was £35. 6s. 6d., thus averaging $7\frac{1}{2}$ d. per lb. The varieties grown were Hackwood Park and Neild's seedling. The former is a prolific variety, but its fruit is too large to suit the requirements of consumers. The latter variety is a seedling of my own raising. It was tried at

Chiswick in 1896, and was given an "award of merit" by the R.H.S., who state that it is of "compact growth, great cropper, clusters overlapping each other, averaging six fruits each; moderate size, round, smooth, dark red, solid, and good flavour." Smooth fruits of medium size are more highly appreciated in the market than large ones. In nearly every instance the smaller fruits realised from 1*d.* to 2*d.* per lb. more than the larger ones.

EXPERIMENTS IN MANURING DURING THE YEAR 1896.

No manure was applied until the roots had taken full possession of the soil, at which time a number of plants growing in different houses, and under varying conditions as to light and sunshine, were selected for the purpose of experimenting with the following manures, which were applied fortnightly at the rate of one-eighth of an ounce to each plant. In each case where more than one kind of manure was used they were mixed in equal proportions, and the exact quantity given. The plants were carefully attended to, and their condition and results noted at the time.

No. 1. Nitrate of soda and muriate of potash.

„ 2. Superphosphate of lime, muriate of potash, and sulphate of iron.

„ 3. Sulphate of ammonia and muriate of potash.

„ 4. Muriate of potash, sulphate of iron, and nitrate of soda.

„ 5. Sulphate of iron and muriate of potash.

„ 6. Muriate of potash.

„ 7. Sulphate of iron.

„ 8. Nitrate of soda.

„ 9. Sulphate of ammonia.

„ 10. Superphosphate of lime.

Nos. 2, 5, 6, 7, and 10 were quite a failure; the fruit was below the average size, and the foliage had a yellow sickly appearance, indicating a deficiency of nitrogen in the soil. The plants appeared so unhealthy that several persons who were not experienced in plant growing noticed their poor condition.

Nos. 3 and 4 produced a moderate crop, and appeared to be fairly healthy.

Nos. 1, 8, and 9 were good, strong, healthy plants, and produced a full crop of fruit. These plants were very similar in condition to others that were supplied with diluted liquid manure from the stables and shippens, but in the end the latter produced the most satisfactory results. It may be observed that sulphate of ammonia alone produced better results than when combined with muriate of potash. Potassic manures have long been considered the best for Tomatos, and yet when muriate of Potash was applied by itself it proved to be a failure.

The plants grown in 1896 were raised from seed sown in the previous December, and the first ripe fruits gathered on the following May 4. It was thought that by sowing earlier, and having large and strong plants, the ripe fruit could be produced earlier in the season. Consequently seed was sown at the end of August, and the young plants were established in pots five inches in diameter before winter set in. The result was not quite satisfactory. Ripe fruit was gathered a fortnight earlier, but the yield per plant was considerably less from these early sown plants than from others of the same variety sown at a later period of the year. The fruit set quite freely, but failed to attain a useful size. This we attribute to a deficiency of pollen during the winter season, as the fruit produced from flowers opening in the spring was of the normal size. The small fruits contained very few seeds, and when they reached maturity were quite agreeable to the taste, differing but little in flavour from normal fruits, except that they appeared to contain more sugar.

EXPERIMENTS IN MANURING IN THE YEAR 1897.

It should be mentioned that no natural or farmyard manure was mixed with the soil, as we believe it has a tendency to produce gross shoots that are more subject to the attacks of disease. Artificial manures were not applied until the plants exhibited signs of having used up all the available food in the soil. With a view to ascertaining the most beneficial manure three sets of plants were selected, the plants in each set growing under exactly similar conditions.

In each case the manure was crushed fine, and when more than one kind was given, they were thoroughly mixed together. Each kind or mixture was applied, at the rate of one-eighth of an ounce to each plant, on the surface, and watered in. A fort-

night elapsed between the first two applications, but afterwards an application was given every week, until towards the end of the season, with evident advantage to the plants.

No. 1. Kainit.

- „ 2. Nitrate of potash.
- „ 3. Kainit and nitrate of soda, equal parts.
- „ 4. Nitrate of potash and nitrate of soda, equal parts.
- „ 5. Kainit, nitrate of soda, and sulphate of iron, equal parts.
- „ 6. Nitrate of potash, nitrate of soda, and sulphate of iron, equal parts.
- „ 7. Nitrate of potash, nitrate of soda, sulphate of iron, and superphosphate of lime, equal parts.
- „ 8. Kainit, nitrate of soda, sulphate of iron, superphosphate of lime, equal parts.
- „ 9. Two parts kainit to one part nitrate of soda.
- „ 10. Two parts nitrate of potash to one part nitrate of soda.
- „ 11. Two parts nitrate of soda to one part kainit.
- „ 12. Two parts nitrate of soda to one part nitrate of potash.
- „ 13. One part nitrate of potash, one superphosphate of lime, one nitrate of soda.
- „ 14. One part kainit, one part superphosphate of lime, one nitrate of soda.
- „ 15. One part nitrate of potash to one part sulphate of ammonia.
- „ 16. Muriate of potash.
- „ 17. No manure of any kind.

Nos. 1, 2, and 16 in each case were quite a failure, which leads me to believe that potassic manure is of very little or no use for Tomatos. When the available food in the soil was used up the leaves turned yellow, and the flowers failed to set. A light dressing of nitrate of soda was then applied, and in the course of three or four days there was a marked improvement in their condition. No. 17 was very poor, but it did not appear to be in a worse condition than Nos. 1, 2, and 16. Nos. 3, 4, 5, 6, 7, 8, 9, and 10 produced very fair results. Nos. 11, 14, and 15 were good. Decidedly the best results were obtained from Nos. 12 and 13, and these were so equally balanced that it was impossible to say which was the better of the two.

The remainder of our plants were frequently supplied with diluted liquid manure from the stables, which acted most

beneficially on them, and confirmed our previous opinion that good liquid manure is still one of the best fertilisers.

PACKING AND PREPARING THE FRUIT FOR MARKET.

Large quantities of fruit are destroyed by bad packing. In many instances the fruit is placed loosely several layers deep in baskets or boxes, with the result that in most cases it arrives at its destination in a bruised and damaged condition. The best system of packing is to place the fruit in a single layer in shallow boxes. The boxes should be strong and light, holding from 10 to 15 lbs. each; and when a larger quantity is to be sent away a number of boxes should be placed on the top of each other, and fastened together with strong cord. A little soft hay, dry sphagnum moss, or wood wool should be placed in the bottom of the box, and on this a covering of soft white paper. The fruit should be packed closely together, stalk end downwards. When the box is full or the requisite quantity put in, the fruit should be covered with paper and all vacant spaces filled with the packing material before the top is put on. Too much emphasis cannot be laid upon the absolute necessity of packing the fruit firmly, to prevent it moving about, as it would thereby become damaged. Neither grass nor any damp material should be used for packing Tomatos, for if they remain in the boxes for several hours, heating or fermentation takes place, which materially injures the quality of the fruit. When Tomatos are sent to market, or have to undergo a railway journey, it is advisable to gather them before they are fully ripe, as in that state they would reach their destination in better condition. It should, however, be remembered that probably there is no fruit that deteriorates more quickly than the Tomato after it is removed from the plant. It is owing to this fact that home-grown Tomatos are so incomparably better than those imported. When Tomatos have attained their full size, and are cut off in a green state, they will subsequently assume an appearance of ripening, but there can be no comparison between such fruit and that which is ripened on the plant.

EXPERIMENTS IN GRAFTING IN 1896.

An interesting experiment was made by grafting the Tomato on the stem of the Potato, and *vice versa*. The Tomato grafted

on the Potato produced a good crop of fruit, although not equal in quantity, nor were the individual fruits so large as those produced by plants growing on their own roots. The Potato stock did not produce the least perceptible change in the flavour of the fruit. A curious circumstance in connection with this union was that the Potato tubers emitted roots quite freely, where, under normal conditions, buds are produced. The Potato stems grafted on Tomato plants did not grow so freely as the Tomato on the potato. Small tubers were produced in the axils of the leaves. The tubers were quite green, and in course of growth produced a number of small buds.

HARDY-PLANT BORDERS.

By Miss GERTRUDE JEKYLL, V.M.H., and Mr. H. SELFE-LEONARD.

WE have been asked by the Council of the Royal Horticultural Society to contribute to its JOURNAL some plans of hardy plant borders, prepared more particularly with a view to maintaining a long succession of blossom or plant beauty. The following plans are the result. The observation is obvious that they are but a slight contribution to a subject of great importance, much in want of thorough and varied treatment at the hands of those practically experienced in garden arrangements; and we therefore trust that similar contributions may be made from other quarters.

The first of the following plans (fig. 102) is for a hardy flower border on a large scale to furnish a decorative plant picture and a succession of flowers from about the middle of May to the middle or end of September. It will be well, however, to state a little more particularly the lines on which it has been prepared, both as an aid in the planting (it may be in the further planting or bettering) of the border, and to prevent those from adopting it (and they may be many) whose wants and conditions it may not suit.

In the first place, it is so far on a large scale (say 15 ft. wide by 135 ft. long) that though it might perhaps be much enlarged, even, with advantage, to suit large places (somewhat similar pro-

portions of length to breadth being retained), its scale could not, on the other hand, be much lessened without loss of effect. This fact would make it unsuitable for very small gardens.

In the second place, large decorative effect being one of its main objects, a limited number of kinds of plants have been used, but each of these generally in considerable quantity and in naturally grown masses. It will thus be seen that the plan will not be suitable to the needs of those who, whether from want of space or other cause, are wanting a border which shall contain a great number of species and varieties.

In the third place, plants which bloom before May or after September have been generally omitted from this plan. In our opinion the later blooming plants, such, for instance, as the finer Michaelmas Daisies, are on the whole better grown in a bed by themselves and not in a mixed border like the present. And, again, as regards those blooming earlier, it is thought that though on the one hand there is doubtless room for the ingenious introduction of spring-blooming plants (bulbous and other), even in quantity, through and among the summer-blooming occupants of such a border, where reasons sufficient exist for that course, yet on the other hand any such attempts at a spring display are better made elsewhere, or at least quite subordinated to the principal purpose. This for several reasons. The fading foliage of spring-blooming plants is an unwelcome intrusion upon the border during summer. These, too, rob the soil not a little, and occupy space better given to summer-blooming plants. All such questions must of course be decided on the balance of advantages; and doubtless such will not infrequently be found to be on the side of borders, so mixed as to include both spring and late autumn-blooming plants. In the case, however, of the plan now in question it has for the reasons given been thought well to exclude them.

It may be added that in the selection of the plants, regard has been paid to securing beauty of foliage as well as of flower, and that so far as those plants are concerned which have been included on this account (*e.g.* Megaseas and Funkias) their blooming season has been disregarded.

Finally, it will be noticed that in this plan flowers of one colour, though of successive flowering seasons, have been brought together in the groups with the purpose of securing a good mass



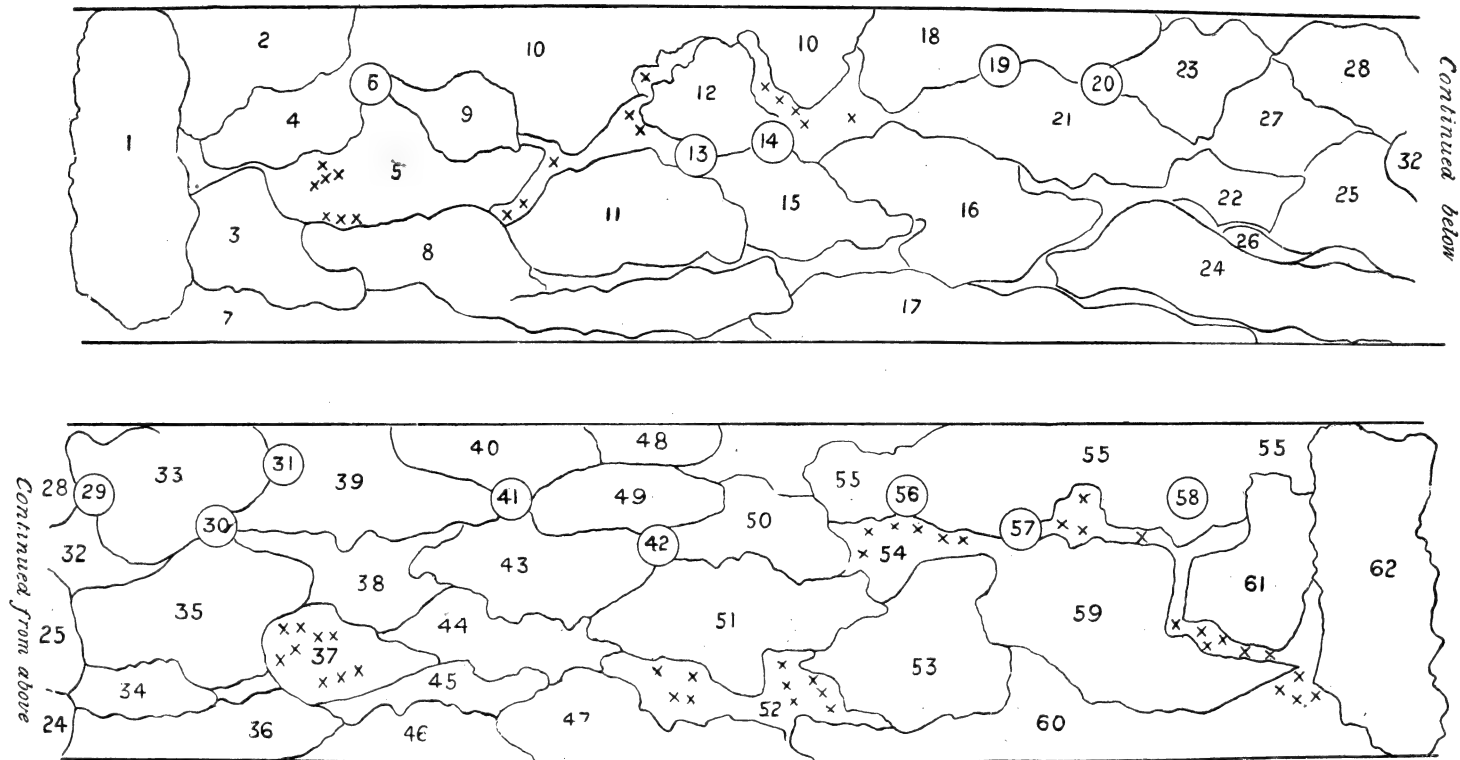


FIG. 102.—FIRST PLAN OF HARDY-PLANT BORDER. N.B.—The Plan has been cut in two in the centre for ease of reference.

of nearly related colouring. Harmonies rather than contrasts have been studied.

We do not wish to suggest that no additions, or even substitutions, can be advantageously made in this plan, if only they be made with knowledge and study. Especially is there room for the introduction to this border, temporarily, of fine later blooming subjects—whether in pots or otherwise—for the purpose of masking or replacing plants which have become unsightly. A small reserve ground or frame will be found a useful adjunct to such a border.

INDEX TO NUMBERS ON FIRST PLAN. (Fig. 102.)

1. *Yuccas*. Preferably *Y. gloriosa* and (or) *Y. recurva*, where good specimens can be secured, and the climate is not too cold. Otherwise *Yucca filamentosa* (of commerce) must be used. It has the advantage of being a comparatively free bloomer.
2. *Polygonum compactum*. It is important to have this species, others (large enough) being too weedy.
3. *Iris florentina*, white flowering and early; and *I. albicans*, a finer white and later bloomer, but needing a warm soil and aspect.
4. Pink *Phlox decussata*, *e.g.*, *Eugénie*, or any other fine true pink.
5. Pink Japanese *Anemone*, *e.g.*, *A. Jap. elegans*.
- 5A. Madonna Lilies (*Lilium candidum*). Marked thus $\times \times$.
6. *Cannas*. For introduction about the month of July, in or from pots, in front of *Delphiniums*, &c.
7. *Anemone sylvestris*.
8. *Funkia* (subcordata) *grandiflora* (white-flowered form only).
9. Three pink *Hollyhocks*.
10. *Delphiniums*.
11. Pink *Pæonies* (vars. of *albiflora* best, *e.g.*, *Belle Douaisienne*).
12. *Veratrum nigrum*.
- 13 and 14. *Cannas*, or *Dahlias* (as above, the colours being chosen to harmonise with their autumn surroundings).
15. Yellow Day Lilies (*Hemerocallis flava*, followed by *H. Thumbergi*; half of each).
16. *Iris pallida*. Varieties *Dalmatica* or *odorata*.
17. *Megasea*, varieties of (*M. cordifolia* purp. is best for flowers; all are about equally good for foliage).
18. *Thalictrums*, preferably *T. flavum* and *T. aquilegifolium*.
- 19 and 20. *Dahlias* or *Cannas* (for autumn succession) as before.
21. *Tritomas* (uvaria). Torch Lilies.
22. *Iris* (so-called *Germanica*) *aurea*, fine yellow.
23. *Helianthus multiflorus*, double.
24. Oriental Poppies and *Gypsophila paniculata*. The latter blooms after the former has died down and covers the bare space.
25. *Tritomas* (uvaria or *aloides*).
26. *Lychnis chalcedonica*, double and (or) single.
27. *Cannas*.
28. *Helianthus multiflorus major* (single).
- 29, 30, and 31. *Dahlias*, scarlet, *e.g.*, *Lady Ardilaun* (tallest), *Cochineal* and *Fire King* (medium height).
32. *Cannas*. These, of course, must be removed by winter, as also the *Dahlias*.

INDEX TO NUMBERS ON FIRST PLAN—(continued).

- | | |
|--|---|
| <p>33. <i>Tritoma nobilis</i>.
 34. <i>Lychnis chalcidonica</i>.
 35. Oriental Poppies and <i>Gypsophila paniculata</i> (as before).
 36. <i>Heucheras</i> (<i>H. rubrifolia</i> or <i>Richardsoni</i> preferably).
 37. <i>Lilium umbellatum</i> (or other good orange summer-blooming variety).
 38. Tall Orange Day Lilies, <i>e.g.</i>, the fine new <i>Hemerocallis aurant. major</i>, or <i>H. Kwanso</i>, fl. pl.
 39. <i>Echinops ritro</i> (blue Globe Thistle).
 40. <i>Thalictrum flavum</i>.
 41 and 42. Dahlias or Cannas.
 43. <i>Telekia speciosa</i>. In strong soil this might run too coarse. In such cases <i>Achillea Eupatorium</i> (Parker's variety) should be substituted.
 44. <i>Oenothera fruticosa</i> (<i>e.g.</i>, <i>Æ. Fraseri</i> or <i>Æ. Youngi</i>).</p> | <p>45. <i>Monarda didyma</i> (best scarlet).
 46. <i>Oenothera missouriensis</i> (= <i>Æ. macrocarpa</i>).
 47. <i>Megaseas</i>.
 48. <i>Verbascums</i>, <i>e.g.</i>, <i>V. Phlomidoides</i> and <i>V. Chaixi</i>.
 49. <i>Delphiniums</i>.
 50. Pink Hollyhocks.
 51. <i>Eryngiums</i> of sorts. <i>E. Oliverianum</i> at the back will be best. In front for contrast, <i>E. alpinum</i>, <i>E. giganteum</i>, &c.
 52. <i>Lilium candidum</i> and <i>Gypsophila paniculata</i>.
 53. Pink <i>Pæonies</i>.
 54. <i>Lilium auratum</i>.
 55. <i>Delphiniums</i>.
 56, 57, and 58. Dahlias and (or) Cannas.
 59. <i>Iris</i> (<i>pallida</i>) <i>Dalmatica</i> or <i>odorata</i>.
 60. <i>Funkia grandiflora</i>.
 61. <i>Polemonium himalaicum</i>.
 62. <i>Yuccas</i>. See No. 1.</p> |
|--|---|

The foregoing plan has comprised, it will be remembered, plants blooming in late spring, summer, and early autumn. In the first of the two following plans (fig. 103) will be found only those blooming in spring or summer, say till the beginning of August. In the second (fig. 104) will be found only late summer or autumn blooming plants.

The first of these may be found useful in those many gardens which are quitted by their owners at the end of the London season; the second in those country seats which, until that time, remain unoccupied. It is obvious that a border planned for all or many seasons can never be as full or as brilliant during any one of them as can a border furnished for one season alone. Either of these plans may, however, be so modified that the border, while retaining, for its main purpose, beauty during one season only, shall not be wholly bare for the rest of the year. For instance, in the autumn border, *spring* bulbs may be planted. And in the earlier border, either autumn blooming bulbs may be inserted, or even not a few carefully selected herbaceous plants—these latter by the side of the leafless roots of early blooming subjects, whose beauty is past, and whose sere foliage it is well thus to mask. Further (and as in former plan), Dahlias, Cannas

or other tender plants may well be introduced yearly for the like purpose. Nor will much ingenuity be required to introduce into either plan a number of good things of even winter interest, and for the sake either of their foliage or their flower at that season. This winter interest, however, may perhaps be best secured by mainly furnishing with evergreen plants the "rockery edgings," which it will be seen are suggested for both of these borders. Such edgings are to be recommended on several grounds, *e.g.* as imparting a desirable "finish" to the border, as increasing the variety and interest of the plants brought together, and as enabling alpine and rock plants to be introduced with success and effect. It is indeed surprising how many, even high mountain, plants may thus be grown, and those who are without rockery and rock garden may be content to grow their alpenes in the manner here suggested.

These plans (figs. 103, 104) have not been drawn to any *very precise* scale. The proportion of length to width is roughly, it will be seen, about five to one. The larger the scale the better, up to, say, 30 feet wide, and long in proportion. As regards the edgings the stones should be sunk naturally, their largest face undermost, to one-half or two-thirds of their depth, and so that when in position they do not rise many inches above the level of the bed. It is best that the front edge of the stones should be below the ground level. That care is taken in regard to the depth and quality of the soil in these borders is assumed. Effect will, of course, be lost with much reduction in the size of the borders. But the plans will still be found available, though on a much smaller scale, and the selection of plants for their season will, we think, be found good, although these may not be planted in those large "colonies" or quantities which alone can do full justice to their beauty.

The form of the borders may well be varied, and be made more natural and uneven.

It should be added that, while in the first plan colour effect has been much studied (and variety in the material used less so), in plans 2 and 3 the main effort has been to collect and group as many as possible of the beautiful and interesting plants of the respective seasons.

The "rockery-edging" surrounding the border is closely furnished between the stones with such plants as the following:—

Hardy heaths in variety; those which bloom in autumn are best omitted from the early border—the larger number bloom in spring.

Saxifrages in variety—mossy and encrusted. Include particularly the pink *S.-Rhæi*, and the red *S. atropurpurea*; also *S. Wallacei* and the early bloomers, *S. apicularis*, *S. sancta*, *S. oppositifolia*.

Aubrietias in variety, particularly the neat *A. tauricola* and the red *A. Leichtlini*; Phlox of the spring-blooming sections, especially Phlox 'Vivid' (pink), Phlox the Bride or *P. nivalis* (white), and also Phlox *amœna*, *Achillea tomentosa*, *A. umbellata*, *A. clavennæ*, *Gentianellas*, &c.

Arabis in variety; *Helianthemums*, single and double in many colours. *Edelweiss*, *Cerastiums*, *Sedums*, and *Sempervivums*. *Anemone pulsatilla*, and other dwarf *Anemones*.

Thymes of many varieties, *e.g.* white-flowered, magenta-flowered, and woolly-leaved.

The great bulk of low-growing alpine and rock plants included in the leading catalogues are also suitable for the purpose.

INDEX TO NUMBERS ON SECOND PLAN. (FIG. 103.)

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|---|--|
| 1. <i>Bambusas</i> (<i>e.g.</i> <i>B. Metake</i> , hardiest.) | 23. <i>Berberis Darwinii</i> . |
| 2. Crimson Rambler Rose (three or four on 8 ft. rough larch poles). | 24. <i>Rosa rugosa</i> Mdme. Geo. Bruant. |
| 3. White Roses (climbing, on do.). | 25. Golden Yew. |
| 4. <i>Aralia Maximoviczii</i> . | 26. <i>Dimorphanthus mandshuricus</i> . |
| 5. <i>Malus floribunda</i> . | 27. <i>Rubus spectabilis</i> . |
| 6. <i>Cratægus Lelandi</i> . | 28. <i>Cydonia</i> (<i>Pyrus</i>) <i>Japonica</i> . |
| 7. <i>Crambe cordifolia</i> . | 29. Evergreen Roses (on rough larch poles). |
| 8. <i>Dimorphanthus mandshuricus</i> . | 30. <i>Heracleum giganteum</i> . |
| 9. <i>Ferula gigantea</i> . | 31. Cut leaved Rheum. |
| 10. <i>Arundo Donax</i> . | The foregoing, it will be observed, furnish the back of the border with large-habited subjects. This backing may be abandoned where it is necessary to plant to the plan on a small scale. Unless a minimum width of 6 ft. can be allowed for this backing it is better dispensed with; indeed, almost necessarily so. |
| 11. <i>Prunus Pissardi</i> . | 32. <i>Yuccas</i> : <i>e.g.</i> <i>Y. gloriosa</i> or <i>recurva</i> . |
| 12. <i>Aralia spinosa</i> . | 33. <i>Tritoma caulescens</i> (July blooming). |
| 13. <i>Clematis montana</i> (on rough poles). | 34. <i>Iris</i> (German) <i>aurea</i> , &c. |
| 14. <i>Rosa rugosa</i> (type, and <i>alba</i>). | 35. <i>Iris hispan.</i> "Leander," and <i>Gypsophila</i> . |
| 14a. Golden Yew (or, if backed by wall, <i>Choisya ternata</i>). | |
| 15. <i>Berberis Darwinii</i> . | |
| 16. <i>Berberis stenophylla</i> . | |
| 17. <i>Arundo Donax</i> . | |
| 18. <i>Salix regalis</i> . | |
| 19. <i>Spirea ariæfolia</i> . | |
| 20. Double Cherry (standard). | |
| 21. Double Almond. | |
| 22. <i>Berberis stenophylla</i> . | |

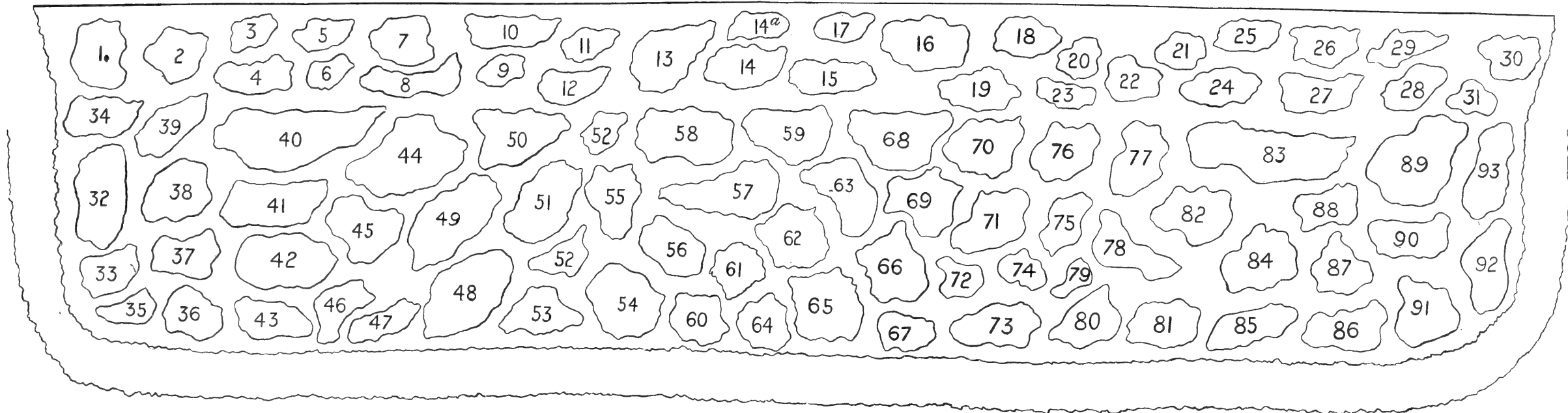
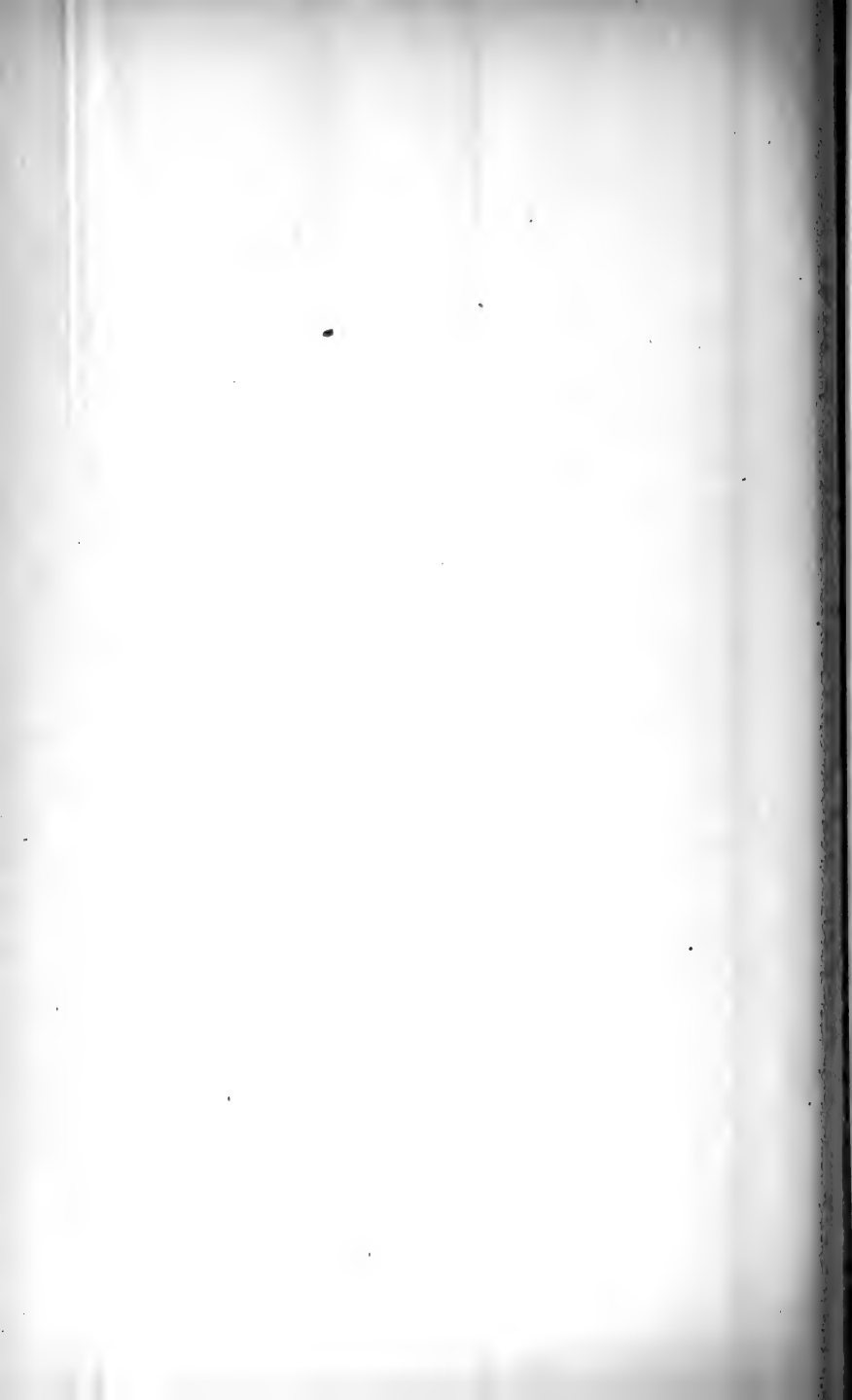


FIG. 103.—SECOND PLAN, OR EARLY-FLOWER BORDER.



INDEX TO NUMBERS ON SECOND PLAN—(continued).

36. Irises, "Innocenza" and *Benacensis*.
37. Pink and white varieties of dwarf Phloxes (*decussata*).
38. Delphiniums and Madonna Lilies.
39. *Iris orientalis*, var. *ochroleuca* or *gigantea*.
40. Tall Delphiniums in variety, *Gypsophila* in front.
41. Double pink and Double white Pæonies.
42. Self Carnations.
43. *Helianthemums*.
44. Oriental Poppies, selected vars., and Red Opium Poppy for succession.
45. Day Lilies, *H. flava*, *H. Thumbergi*, and *H. aurant. major*.
46. *Erica carnea*.
47. *Helianthemums*.
48. *Statice latifolia* in ground-work of *Waldsteinia trifoliata*.
49. *Scabiosa ochroleuca*.
50. Crown Imperials, especially the yellow.
51. Tall early Daffodils, of large trumpet section, with select double *Potentillas* to succeed.
52. *Achillea Eupatorium*.
53. *Iris pallida*, lavender (better in the vars. *dalmatica* (an odorata), and *I. albicans* (white)).
54. Single Pyrethrums, choice vars., with Daffodils in variety to precede.
55. Lilies, early, as *longiflorum* (white), *umbellatum* (orange), &c.; *Crocus* in clumps interspersed.
56. *Achillea filipendula*.
57. *Thalictrum flavum*, *Iris aurea* (species).
58. *Iris ochroleuca*, and *I. spurium* or *I. Monspur*.
59. *Oenothera Lamarckiana*.
60. *Rhus cotinus atropurp.* (carpet with *Aubrietia*).
61. *Alyssum argenteum* (shrubby).
62. *Dictamnus fraxinella* and *D. frax. alba*.
63. *Epimediums*.
64. *Cheiranthus* of sorts (*alpinus*, *Marshalli*, *mutabilis*, and *mutabilis var. purpureus*).
65. Carnations and *Statice*.
66. *Lychnis chalcidonica*.
67. *Campanula* (*Platycodon*) *Mariesi*, and *do. album*.
68. Double Pæonies with *Gypsophila* in front.
69. Select German Iris.
70. *Eremurus* in variety, but only if the large scale of the border be retained.
71. *Dicentra spectabilis*, and, for succession, Red Opium Poppy.
72. *Veronicas* (shrubby) (*Colensoi*, and others of medium height), bulbs among and surrounding them.
73. *Rhus cotinus*, with *Chionodoxas* and other small bulbs; *Veronicas*, *salicornioides*, *Lyalli*, and other small species.
74. *Linums*, *narbonense* and *L. monogynum*.
75. *Choisya ternata*.
76. *Cistus ladaniferus*.
77. *Coreopsis lanceolata*.
78. *Tulipa Gesneriana* and others, interspersed with *Veronicas carnosula* and *epacrioides* for succession.
79. Young's Golden Juniper (standard).
80. *Tulipa Greigi* and *Veronica buxifolia*.
81. *Narcissus* in variety, *Potentilla formosa*, and *Potentilla fruticosa*.
82. *Scabiosa caucasica* (in front), *Scab. ochroleuca* (in rear).
83. Delphiniums, Madonna Lilies, and *Phlox coccinea* (in masses side by side, not mixed).
84. *Berberis dulcis nana*, *Narcissus* planted round.
85. *Primula denticulata*, and *P. d. alba*, and *P. capitata*, with carpet of *Herniaria glabra*.
86. *Helianthemums*.
87. *Dicentra spectabilis*, *Gypsophila paniculata* between.
88. Standard Golden Yew, with surrounding carpet of mossy Saxifrage.
89. Selected Pæonies, rose and white (in rear), selected German Iris, *e.g. aurea*, *Mdme. Chereau*, *Queen of May*, *Innocenza* (in masses in front).
90. Yellow Crown Imperials and *Gypsophila paniculata*.
91. *Statice latifolia*.
92. Carnations (border selfs) and Pink "Snowflake" (in front).
93. *Yucca recurva*.

INDEX TO NUMBERS ON THIRD PLAN. (Fig. 104.)

1. *Bambusas*, e.g. *B. Metake* (the hardiest).
- 2 and 3. Climbing Roses, of contrasting colours; autumn bloomers, on poles; three of each. (*Gloire de Dijon*, *Zepherine*, *Drouot*.)
4. *Aralia Maximoviczii*.
5. *Tritoma nobilis*, *T. grandis*, *T. Lachesis*.
6. *Cratægus Lelandi*.
7. Standard (6 ft.) *Cotoneaster microphylla*. Rose "Stanwell" beneath.
8. *Dimorphanthus mandshuricus*.
9. *Eulalia zebrina*.
10. *Arundo Donax*.
11. *Prunus Pissardi*.
12. *Aralia spinosa*.
13. *Helianthus orgyalis*. *Rosa rugosa alba*, in front.
14. Golden Yew.
15. *Rosa rugosa* (type or *alba*).
16. *Berberis stenophylla*.
17. *Berberis Darwinii*.
18. *Salix regalis*.
19. *Eulalia univittata*.
20. If backed by wall, *Choisya ternata*; otherwise substitute Golden Yew.
21. *Clematis Jackmanni*.
22. *Clematis Jackmanni alba*.
23. *Clematis lanuginosa* in variety (over low larch supports).
24. *Polygonum sacchaliense*.
25. Golden Yew (several vars.).
26. *Dimorphanthus mandschuricus*.
27. *Heracleum giganteum*.
28. Rose Mdme. Geo. Bruant.
29. *Bambusas*.
30. *Eulalia*.
31. Golden Yew.
32. *Clematis*, raised on rough larch supports.

Note. — Numerous climbers, tender or hardy, annual or perennial, may well be introduced among the foregoing, such as the best climbing *Tropæolums*, *Ipomæas*, *Convolvulus*, *Mina lobata*, *Rhodochiton volubile*, and many others. The taller plants over which these are allowed to clamber must be carefully selected,

however, and be those which can "hold their own" against rampant growth.

33. *Yuccas*.
34. Pink Japanese *Anemone* (*A. japonica elegans*).
- 35 and 36. Border Carnations, pink (say, *Raby Castle*), yellow (say, *Sir Robert Peel* or *Miss Audrey Campbell*).
37. *Polygonum compactum*.
38. Pink *Phlox decussata*, e.g. *Eugénie*, *Beatrice*, or other fine variety of same colour.
39. White *Phlox decussata*, dwarf variety.
40. *Statice latifolia* and *Gypsoph. paniculata*.
41. *Cannas*, brought on in spring in heat.
42. *Funkia subcordata grandiflora*; white, scented.
43. *Tritoma Macowani* and *Inula hirta*.
44. Pink Hollyhocks.
45. Border Carnations: say, *Old Clove* (maroon) and *Miss Ellen Terry* (white).
46. *Tritoma Pfitzeri* and *T. coralina*.
47. Dwarf *Cannas*.
48. *Delphiniums*, *Belladonna* and *magnificum* (for late second bloom); early summer bloom may be *disbudded*.
49. *Phlox decuss.*, Best Salmon-coloured.
50. *Enothera missouriensis*.

Note.—The backing of this border (Nos. 1 to 32) has, like the rest of this plan, been here composed of tall subjects, *in beauty from August to October inclusive*. But it were better composed wholly of evergreen plants in variety, if it be necessary to hide a bare fence, or to shelter on that side in winter and spring the other occupants of the border.

Comparison of the backing used in this (autumn) border with that in the preceding (spring) border may be suggested. Some may find it well more or less to substitute the one for the other, at least in part, when it is desired to

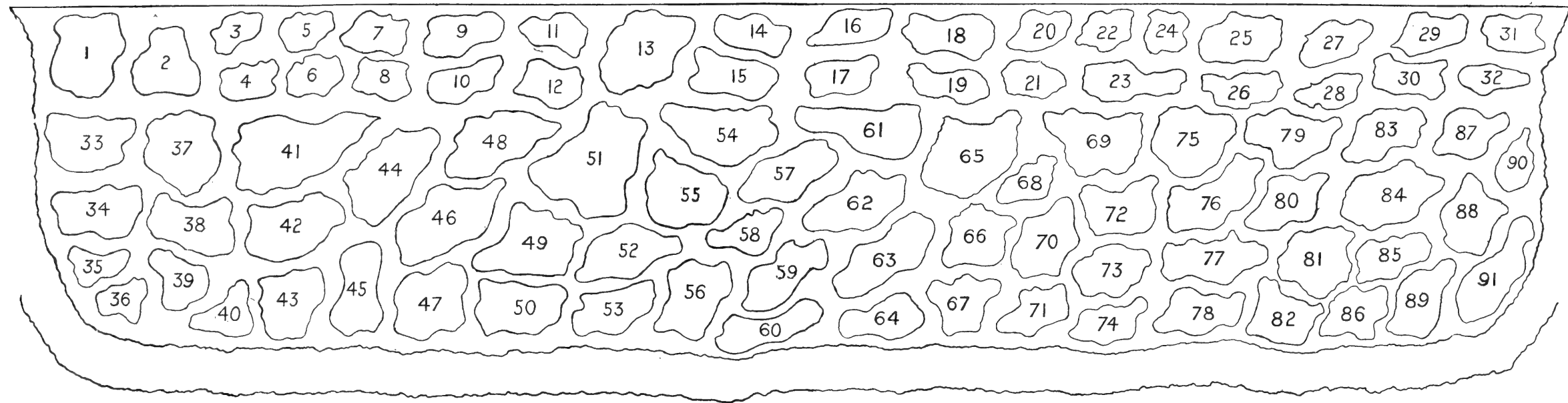
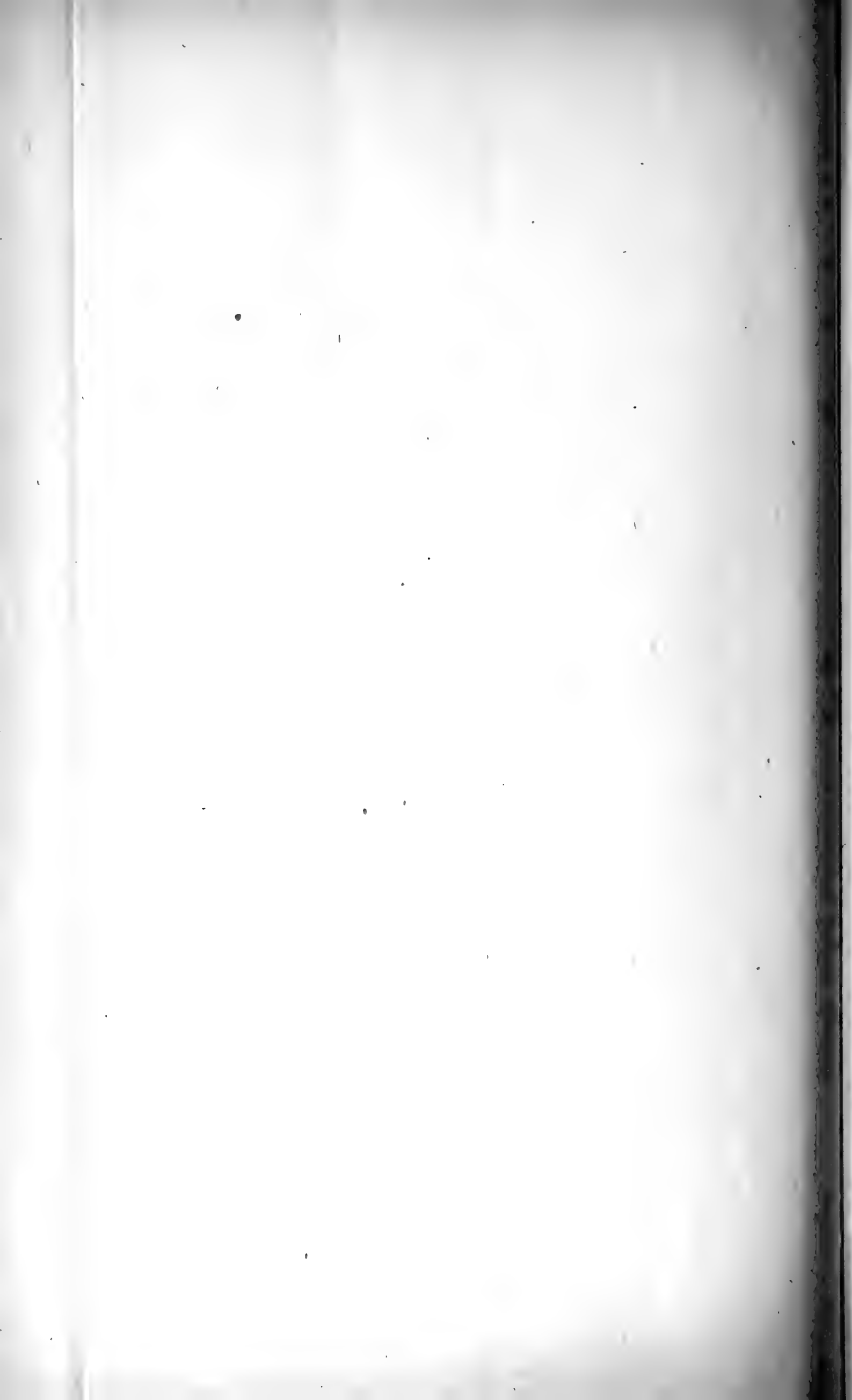


FIG. 104.—THIRD PLAN, OR LATE-FLOWER BORDER.



INDEX TO NUMBERS ON THIRD PLAN—(continued).

prolong the beauty or interest of the border into the other season.

The "Rockery edging" in this plan may be of the same material as in the last. Thus, however, its chief interest as regards bloom would be in the spring, though in respect of foliage its beauty would be lasting. The great majority of dwarf rock plants bloom before autumn; but the following, among others, may be introduced for autumn flowering:—*Silene quadrifida* and *S. Schafta*, Autumn Crocus, *Colchicums* and *Sternbergias*. Many *annuals late sown* for the purpose, such as *Androsace coronopifolia*, *Papaver alpinum* and *Lychnis Lagascæ* (neither of these are annuals), *Papaver nudicaule* and *umbrosum*, and *Berberis empetrifolia*.

51. *Dahlia*, *e.g.* Scarlet King, *Harpalium* "Miss Mellish," *Helenium superbum*, and *Hel. striatum*.
52. *Phlox* (decuss.) *coccinea*.
53. Henry Jacoby *Pelargonium*.
54. Red Opium Poppy and *Verbascums*, *e.g.* *V. phlomoides*.
55. *Lilium tigrinum*.
56. Border Carnations, *e.g.* The Spy (white), Hayes scarlet, and Mrs. Reynolds Hole.
57. Hollyhocks.
58. *Echinops Ritro*.
59. *Eryngium alpinum*.
60. *Eryngium giganteum* (biennial).
61. *Helianthus multifl. major*.

62. *Eryngium Oliverianum*.
63. *Achillea Eupatorium* (Parker's variety, 4 to 5 ft.).
64. *Aster discolor* (versicolor nanus), and *Schizostylis coccinea*.
65. *Tritoma Saundersi* and *Achillea Eupatorium*.
66. *Asilbe rivularis*.
67. *Cistus ladaniferus* and *C. purpureus*.
68. *Dahlia*.
69. *Eryngium Oliverianum*.
70. *Crinum Powellii*.
71. *Cotoneaster horizontalis* (mossy *Saxifrage* below).
72. *Coreopsis lanceolata*.
73. *Pyrethrum uliginosum*.
74. *Rudbeckia Newmanni*.
75. *Helianthus multifl. flore pleno*.
76. *Salvia splendens* (greenhouse in winter).
77. *Echinops Ritro* (Blue Globe Thistle).
78. *Aster Amellus major*, and *Aster vimineus*.
79. *Rubus canadensis rosea*.
80. White Japanese *Anemone*.
81. *Phlox decuss.*, best dwarf vars. (Lemoine's).
82. *Spiræa*, "Anthy. Waterer."
83. Red Opium Poppy (biennial).
84. Hollyhocks (selected doubles).
85. *Achillea Eupatorium*.
86. Henry Jacoby *Pelargonium*.
87. *Actæa* (*Cimicifuga*) *cordifolia*.
88. *Gypsophila paniculata*.
89. *Alyssum argenteum*.
90. *Aconitum autumnale*.
91. Border Carnations.

NOTES ON SOME CURIOSITIES OF ORCHID
BREEDING.

By Mr. C. C. HURST.

[Read Oct. 12, 1897.]

DURING the past few years the number of Orchid hybrids raised by hand has increased by leaps and bounds, and with this increase have come numbers of curiosities and mysteries which seem to baffle us at every turn. Fortunately during the same period much light has been thrown on the actual details of fertilisation, and my object in these notes is to put on record in a concise form a few of these curiosities, and at the same time to view them in the light of recent researches. A careful study of these curiosities suggests the desirability of working through the normal up to the abnormal, and you will perhaps pardon me if before dealing with the extraordinary I give you a brief outline of the ordinary facts of hybridisation, and then I think we shall be better able to deal with "Some Curiosities of Orchid Breeding."

HYBRIDS OF THE FIRST GENERATION.

Hybrids between two distinct species of Orchids are generally intermediate in character between their two parents, and usually are so intermediate as to be quite distinct from either.

For instance, the well-known garden hybrid *Cypripedium* \times *Leeanum* is fairly intermediate between its two parents, *C. Spicerianum* and *C. insigne*, so much so that it is quite distinct from either.

Sometimes one part of a hybrid appears to resemble one parent more than the other; for instance, in *C. \times Leeanum* the upper sepal of the flower outwardly seems to resemble *C. Spicerianum* more than *C. insigne*; while, on the other hand, the staminode of the flower and the leaves and general habit of the hybrid appear to incline towards *C. insigne* rather than *C. Spicerianum*.

Yet Professor Macfarlane, of the University of Pennsylvania, Philadelphia, U.S.A., who has carefully worked out the minute structure of this hybrid, found that even these parts were fairly intermediate in character, though it was not so apparent to the naked eye. ("Minute Structure of Plant Hybrids," *Trans. Roy. Soc. Edin.* 1891, xxvii., Part I., No. 14, p. 245.)

Professor Macfarlane found that the margin and inner surface of the upper sepal of *C. × Leea* were both covered with simple and glandular hairs side by side, while the parent *C. Spicerianum* had glandular hairs *only*, and the parent *C. insigne* simple hairs *only*; further, the hybrid had the ruby hairs of *C. Spicerianum* along the midrib, though less in number, and the glabrous spots of *C. insigne*, but reduced in size and number. (*Id.* p. 247.)

Again, the staminode of *C. × Leea* in colour and roughness of *surface* outwardly resembles that of *C. insigne*, there being no trace apparently of the purple and white smooth staminode of *C. Spicerianum* (except the slightly modified shape), but a section clearly showed a structure intermediate between both parents, and a reduction by one half in the size of the *protuberances* and in the number of hairs. (*Id.* p. 248.)

Further, though the leaves and the general habit of the hybrid seem to incline towards the parent, *C. insigne*, yet Professor Macfarlane observed that their inner structure was fairly intermediate between both parents; curiously enough, in the average number of stomata and epidermal cells the upper surface of the leaf inclined considerably towards *C. insigne*, while the under surface slightly leaned towards *C. Spicerianum*. (*Id.* p. 245.)

Other hybrids have been examined minutely by Professor Macfarlane, and all have more or less given the same results, which thus show that the inner tissues, as well as the outer characters, if carefully observed, are found to be fairly blended between the two parent species.

A plate prepared by Professor Macfarlane shows this very clearly. The beautiful colour of the hybrid *Masdevallia × Chelsoni* and its two parents, *M. Veitchiana* and *M. amabilis*, is due in a large measure to the crimson hairs which are distributed thickly over the surface of the sepals. When magnified, the hairs of *M. Veitchiana* are seen to be globular in shape, while those of *M. amabilis* are cone-shaped; on the other hand, the hairs of the hybrid are club-shaped, being intermediate between the two and distinct from both. (*Id.* p. 242, Plate VII., figs. 3, 4, and 5.)

True hybrids between two distinct species are not found to differ from one another more than individuals of a species are

wont to do. Thus *Cypripedium Spicerianum* crossed with *C. insigne* always produces *C. × Leea-num*, whether from the same seed-pod or from different seed-pods, and can never be mistaken for anything else. Nor does it matter which way the cross is made, whether *C. Spicerianum* be used as the seed parent (*C. Spicerianum* ♀ × *C. insigne* ♂) or whether *C. insigne* be used as the seed parent (*C. insigne* ♀ × *C. Spicerianum* ♂); no matter when or where they may be crossed (if proper fertilisation takes place), they always produce *C. × Leea-num*. Hence we see the great importance of having one recognised name, *and one only*, for all hybrids between the same two species. (See my notes on "Nomenclature of Orchids," *Orchid Review*, iv. p. 165.) Naturally, like species, hybrids from the same two species vary considerably in minor details, especially in colour and size, which, though of little importance to the systematic botanist, yet make or mar a plant in the eyes of the Orchid grower; and it is very necessary from an artistic and commercial point of view that these colour and size variations should, when distinct, bear a special name; but it is equally necessary that this name should be a varietal one only, and not a specific one, in order that the scientific nomenclature of hybrids be not tampered with.

These variations in hybrids of the first generation are generally found to correspond with the varieties of the parent species, and to have the same limited range. For instance, the varieties of the hybrid *C. × Leea-num* are almost innumerable; but so are the varieties of one of its parents, *C. insigne*; and it is generally found that if the particular variety used as a parent be a constant one, it will affect the hybrid offspring in a particular way. For instance, to take two extreme cases, *C. Spicerianum* ♀ × *C. insigne* *Sanderæ* ♂ (*a very light form* of *C. insigne*), raised by Mr. Seden for Messrs. Veitch & Sons, of Chelsea, produced *C. × Leea-num* 'Prospero,' *a very light form* of *C. × Leea-num*. (*Orch. Rev.* v. p. 65, and R.H.S., January 12, 1897.) Again, *C. Spicerianum* ♀ × *C. insigne* *Wallacei* ♂ (*a heavily and densely spotted variety* of *C. insigne*), raised by M. Jules Hye, of Gand Belgium, produced *C. × Leea-num* *Albertianum*, *a heavily and densely spotted variety* of *C. × Leea-num*. (*Cogn., Dict. Icon. des Orch.* February 1897, *Cyp. hyb.* pl. 3A.) If the particular variety used be not a constant one, many variations will be produced even from one seed-pod.

A few years ago Mr. Chas. Winn, of Selly Hill, Birmingham, showed me a large number of *C. × Leea-num* in flower, which were raised by him from *C. insigne Chantini* and *C. Spicerianum*. Hardly any two plants were alike in colour or spotting, and they also varied in the shape of the upper sepal, some being much more reflexed than others; and one might easily have picked out from this batch of seedlings many well-marked varieties, including the typical *C. × Leea-num*, *C. × L. superbum*, and *C. × L. giganteum*, to say nothing of intermediate forms and minor varieties. We need not, however, be surprised at this when we learn that one of the parents, *C. insigne Chantini*, though a well-marked variety, is not a constant one from seed.

Mr. W. Grey, for Hon. Erastus Corning, Albany, New York, U.S.A., raised seedlings of *C. insigne Chantini* fertilised with its own pollen, and produced thirty different varieties from one pod (*Orch. Rev.* ii. p. 227); so that *C. insigne Chantini* is evidently a variety "with a past," and when crossed with *C. Spicerianum* its history tends to repeat itself, and many forms of *C. × Leea-num* are the result.

On the other hand, we know that some varieties are quite constant from seed, for Mr. Norman Cookson, of Wylam-on-Tyne, fertilised *C. Lawrenceanum Hyea-num* (a so-called "albino") with its own pollen; and of the plants raised therefrom three have already flowered true to the parent variety (*Gard. Chron.* January 16, 1897, p. 37, fig. 8), so that *C. L. Hyea-num* is evidently a variety "without a past," and for a few generations its history must have been regular and consistent: it consequently breeds true to colour, and would no doubt set its peculiar mark on its offspring if crossed with another species, in the same way as we have seen that *C. insigne Sanderæ* has done in *C. × Leea-num 'Prospero,'* and *C. insigne Wallacei* in *C. × Leea-num Albertianum*.

REVERSE CROSSES.

It sometimes happens (especially when only a few plants have been raised of a particular cross) that the reverse cross ($B \text{ ♀} \times A \text{ ♂}$ instead of $A \text{ ♀} \times B \text{ ♂}$) produces hybrids differing in variety from the original cross, and many people have immediately come to the conclusion that this variation was due to the parents being reversed. But, as can easily be perceived, this does not

necessarily follow. *Post hoc* certainly, but *ergo propter hoc* by no means. This palpable fallacy is further exposed when we find that many reverse crosses are not at all different; for instance, Mr. Seden, for Messrs. Veitch & Sons, crossed *C. Schlimii* ♀ with *C. longifolium* ♂ and *C. longifolium* ♀ with *Schlimii* ♂, which produced the well-known hybrid *C. × Sedenii*. "No perceptible difference was observed between the plants raised from the two separate crosses: they agree in habit, foliage, structure, and colour of flower; in fact in every particular." (Veitch, *Man. Orch.* Part X. p. 143.) Instances like this completely dispose of the theory that reverse crosses are intrinsically different.

A careful inquiry into the variations occasionally seen in reverse crosses shows that they are mostly due to a different variety being used as a parent in each case, the offspring varying accordingly.

In the few cases in which the same variety has been used in each case the variation is no doubt due to the variability of the parent's history, which is duly handed on to the offspring, and if but one or two plants be raised from each cross the chances are that the survivors will be widely different.

Theoretically, if every possible variety could be raised between *A* ♀ × *B* ♂ and between *B* ♀ × *A* ♂ on comparison the varieties of the former would be found to correspond with the latter exactly. It would be difficult to demonstrate this in Orchids, because out of thousands of individual seeds in a pod so few plants are raised which arrive at the flowering age; but it has been demonstrated in plants other than Orchids by the experiments of careful observers. (Kerner and Oliver, "Natural History of Plants," ii. p. 557.)

To sum up the ordinary facts of *hybridisation* :—

(1) Hybrids of the first generation between two distinct species are generally intermediate between their parents.

(2) This applies to their inner structure as well as to their outward characters.

(3) They are so far intermediate between their parents as to be quite distinct from either.

(4) All hybrids between the two same species are specifically alike, but like species differ in varietal characters.

(5) These varietal differences are found to correspond with the varietal differences in the parent species.

(6) Whether these varietal differences are handed down truly from the species to the hybrid depends upon the history of the variety; if constant it will hand it on truly, if variable it will hand it on as variably.

(7) There is no intrinsic difference in reversed crosses.

POLLINATION AND FERTILISATION.

Having ascertained the ordinary results of the hybridisation of two distinct species, it will perhaps clear the way *still further*

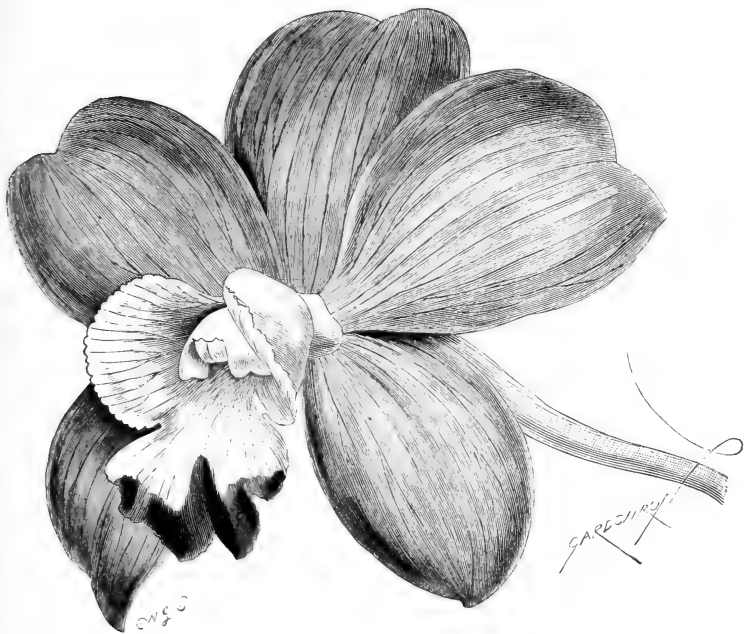


FIG. 105.—SOPHRO-CATTELEYA \times CALYPSO (SOPHRONITIS GRANDIFLORA f \times CATTELEYA LODDIGESII m). (*Gardeners' Chronicle*.)

if we briefly follow out the inner details of pollination and fertilisation, having special regard to recent researches and observations. So far as I know, the most recent work that has been done in Orchids, in regard to the processes of fertilisation, was carried out by Mr. Harry Veitch, F.L.S., 1885-87, the results of which were published in the *Journal of the Linnæan Society*, vol. xxiv. No. 163, p. 395 (also in Veitch's "Manual of Orchids," Part X. p. 83); and I am much indebted to Mr.

Veitch for his invaluable observations. Mr. Veitch followed out the inner processes from pollination to fertilisation in *Cattleya Mossiæ* pollinated with its own pollen. The pollen masses were applied in the usual way. Two days afterwards the flower faded and the pollen masses began to break up into groups of grains and became thoroughly mixed up with the sticky fluid of the stigma, and from some of the grains short tubes were already pushed out. After six days the pollen tubes had largely increased in numbers, and the longest had reached the base of the column, having worked their way down the duct leading through the middle of the column from the stigma to the seed-chamber or ovary. During this time a wonderful change had taken place in the ovary, or *seed-pod*. Before pollination it was circular in shape; fourteen days later it was triangular and swollen; and at the end of thirty days its walls were still more swollen, and the ovules, the future seeds, were gradually developing into shape and form, though there were as yet no signs of fertilisation. At the end of thirty days the pollen tubes had entered the ovary, and were pushing down along its walls by the side of the placentas which bore the ovules. After fifty-five days the pollen tubes had reached the bottom of the ovary, and were all among the ovules in countless numbers, but no signs of fertilisation could be traced. Seventy-five days after pollination Mr. Veitch found the tips of the pollen tubes in contact with the opening leading into the ovule (micropyle), and at this time actual fertilisation began to take place, changing the ovules into seeds.

So far back as 1863 Dr. Hildebrandt made observations in the Botanic Gardens at Bonn on the processes of fertilisation in Orchids, somewhat similar to Mr. Veitch, but in different genera. (Mohl and Schlechtendal, *Botanische Zeitung*, 1863, Nos. 44 and 45.) Dr. Hildebrandt found that the period between pollination and fertilisation varied considerably in different Orchids: the period in *Dendrobium nobile* he found to be about 120 days, *Phaius grandifolius* sixty days, *Cypripedium insigne* 120 days, while in hardy terrestrial Orchids, *Listera ovata*, *Neottia nidus-avis*, and *Orchis pyramidalis* the period was but eight to nine days, and *Gymnadenia conopsea*, *Orchis morio*, and *O. maculata* about fourteen days. As far as I know, no one has carried actual observations in the fertilisation of Orchids beyond this stage,

owing, no doubt, to the fact that the ovules of Orchids being so minute, the further processes would be extremely difficult to follow. Yet there can be little doubt that the further details of fertilisation in Orchids (in common with those already observed) are much the same as in other flowering plants. Indeed, the ultimate processes of fertilisation seem to be much the same in all forms of life. Professor Strasburger and others have worked out the details of fertilisation with marvellous precision in a plant of the genus *Ornithogalum* (Star of Bethlehem), which belongs to the Liliaceæ order, a family closely allied to Orchids. Professor Strasburger observed (Kerner and Oliver, "Natural History of Plants," ii. p. 416) that the pollen grain contained one or two germ cells, which were made up of a nucleus surrounded by a small portion of naked protoplasm. One of these germ cells, or pollen cell, as we may conveniently call it, is carried along near the tip of the pollen tube as it gradually lengthens, and eventually is discharged from the tube through the opening of the ovule into the embryo-sac. Having reached this, the pollen cell at once makes for the egg cell contained therein, and, being many times smaller than the egg cell, enters into it, the nucleus of the pollen cell uniting with the nucleus of the egg cell, the outcome being a fertilised egg cell which in due time becomes the living embryo of the seed. In this way, by the union of the pollen cell of the father with the egg cell of the mother, a new individual is brought into being. We have already seen that characters are handed on equally by both parents; therefore it necessarily follows that in some way or other the determinants of the characters of the father parent are packed up in the small compass of the pollen cell, and those of the mother parent in the egg cell.

We have seen that the pollen cell is many times smaller than the egg cell, consisting as it does almost wholly of nucleus, and we also know that the nuclei of both are fairly balanced in size and contain the same elements. Therefore it naturally follows that in the handing down of characters from one generation to another, the nucleus is the all-important matter, and the surrounding protoplasm, which is so considerable in the egg cell, and so inconsiderable in the pollen-cell, has little or nothing to do with it, though no doubt it serves a useful purpose as a source of food supply for the nuclei and the future embryo.

Recent researches into the nature of the nucleus carried out by Professor Weissmann and others tend to show that the most important elements in its constitution are certain rod-like fibres, looped threads, or round grains called "chromosomes" (identants of Weissmann), which change their appearance and their position from time to time, but which nevertheless generally remain constant in number in the same species.

These are present in the nucleus of every cell, but in the germ cells *at the time of fertilisation*, not only is their position and shape altered, but *their number is apparently decreased by one half*, and, according to Professor Weissmann's interpretation of the facts in his well-known book, "The Germ-Plasm" (Contemporary Science Series), the essence of fertilisation consists in the removal of one half of the nuclear elements from the egg cell of the mother and the replacing of them by an equal number from the pollen cell of the father, and in this way Professor Weissmann accounts for the different phenomena of heredity, reversion, and variation, and endeavours to make clear the many mysteries of inheritance which have puzzled philosophers and naturalists from Aristotle to Darwin.

Later researches *seem likely* to modify Prof. Weissmann's speculations considerably; but they are not yet sufficiently advanced to form a definite opinion upon, and we must be content to wait patiently for further facts.

I am not aware that the number of nuclear fibres in the cells of Orchids has yet been ascertained, but in the closely allied order of Liliaceæ, in the plant *Lilium Martagon*, M. Guignard has recently observed that while the ordinary cell contained twenty-four nuclear fibres the ripe egg cell had but twelve, apparently showing that it was ready for fertilisation. (M. Guignard, *Compt. Rend.*, May 11, 1891, and *Nouv. Etudes sur la Fécondation*, "Ann. Science Nat. Bot." vol. xiv. 1891, p. 163.) So that if we take *Cypripedium* × *Leeanum* as our typical hybrid, we find that its nuclear fibres would be made up one half from its parent *C. Spicerianum* and the other half from its other parent, *C. insigne*; both the parents being pure species their own nuclear fibres would of necessity be pure and true (their ancestors for many generations having been the same species as themselves). These nuclear fibres being, as we have seen, the bearers of the hereditary characters, and determining

the building up of the future individual, it is manifest that the hybrid *C. × Leea-num* is of necessity an equal blending of its two parent species.

CURIOSITIES.

Occasionally, when two species are crossed, the offspring resemble the mother species only, having no trace of the father species or any other modifying influence. I have found eleven such cases recorded during the past four or five years, and through the kindness of several correspondents and the editor of the *Orchid Review* I am able to give details and particulars of five of these cases.

(1) In May 1891 Mr. Reginald Young, of Sefton Park, Liverpool, crossed *Cypripedium barbatum* ♀ with pollen of *C. niveum* ♂. The pod duly ripened, and fourteen plants were raised, of which nine have already flowered. Strange to say, every one of the nine has flowered *C. barbatum*, like the mother species, without a trace of the father parent, *C. niveum*, either in the flowers or leaves. The same cross has been made at least twice before by Messrs. Veitch & Sons (*Gardeners Chronicle*, November 27, 1886), and by Mr. W. Bull, of Chelsea (*Gardeners' Chronicle*, December 20, 1888), both of which produced the true hybrid *C. × Tautzianum*, and in which the father species, *C. niveum*, was strongly represented in both flower and foliage. (See col. fig. *Reichenbachia*, ii. t. 65.)

(2) Curiously enough, Mr. Young had a somewhat similar experience with another cross. In March 1892 he crossed *C. callosum* ♀ with pollen of *C. × microchilum*, and in due time twelve plants were raised, one of which flowered last May 1897, producing two flowers on one scape, which were practically indistinguishable from the mother species, *C. callosum*.

(3) Some years ago Mr. Charles Winn crossed a flower of *C. venustum* ♀ with pollen of *C. concolor* ♂. Eighteen seedlings were raised, five of which flowered pure *C. venustum* without a trace of *C. concolor*. (Mr. Winn did not wait for the other plants to flower, but threw them away.) (*Orchid Review*, iii. p. 240; in litt., September 20, 1897.) The same cross had been made before by Messrs. Veitch & Sons (*Gardeners' Chronicle*, 1875, p. 804; *Orchid Album*, t. 418) and by Mr. Robert Grey for Mr. H. Graves, of Orange, New Jersey, U.S.A. (*American Gardening*, March 23, 1895), in both of which the

influence of *C. concolor* was very marked, the hybrid being called *C. × Marshallianum*.

(4) In the *Garden*, May 26, 1888, the following note, signed by "W.," appears :—" I recently saw in Mr. Buchan's garden at Southampton a very good seedling of *Cypripedium* (*longifolium*) *Roezlii*, which had been obtained from the same pod of seed which produced *C. × Sedeni candidulum* (*C. (longifolium) Roezlii* ♀ × *C. Schlimii albiflorum* ♂), evidently proving that all the seeds were not crossed."

(5) Mr. George McWilliams, of Whitingsville, Mass., U.S.A., crossed *C. Spicerianum* ♀ with pollen of *C. niveum* ♂, and all of the plants came true *C. Spicerianum*; while at another time Mr. McWilliams raised from *C. niveum* ♀ × *C. Spicerianum* ♂ seedlings which showed both parents distinctly. (In litt., September 20, 1897. See *American Gardening*, March 23, 1895.) The same thing too has been observed and recorded in Lilies, Begonias, Strawberries, and other plants; they have been called "False Crosses." (See *Gardeners' Chronicle*, Nov. 10, 1894, p. 568.)

The first question that naturally arises when considering these curiosities is, Are they true hybrids? Were the seeds from which they were raised fertilised by the pollen of the foreign species? If so, why are they not like the intermediate hybrids raised before by others from the same cross, or, as in one case, from the same seed-pod? Now that we know something of the actual details of fertilisation, we can confidently say that these intermediate or true hybrids contained one half the nuclear elements of the mother species and one half of the father species; but can we truly say this of these curiosities? I think not. If these curiosities reproduce the mother species simply, then they must be made up of the nuclear elements of the mother species only. In other words, they must either have been brought into existence by self-fertilisation, or the ovules were developed without the aid of pollen at all, which has been known to occur at least once in an Orchid (Prof. Henslow, *Structure of Flowers*, p. 171), which I will refer to in detail later on.

But all seeds produced without pollen (parthenogenesis) always reproduce the mother plant exactly down to the smallest detail, being nothing more nor less than seed-buds. But Mr. Young writes :—" The plants of my *C. barbatum* ♀ *C. niveum* ♂

which have now flowered (nine in number), have *not* been exactly alike, either in flower or foliage, nor exactly like the seed parent *C. barbatum*: one plant has flowered with miserably small blooms, much inferior to the parent *C. barbatum*, and this although otherwise the plant appeared healthy and strong. . . . One or two, I may say two certainly, showed more white in the dorsal sepal than the others, or than the seed parent, but not sufficient to show as a *C. barbatum* ♀ *C. niveum* ♂ cross. The foliage, too, varies slightly in substance and markings." (In litt., September 3, 1897.) Mr. Young also tells me that the one plant of *C. callosum* ♀ × *C. × microchilum* ♂, which flowered *C. callosum*, is not at all like the mother variety in form. Mr. Winn writes to me that the five plants of *C. venustum* ♀ × *C. concolor* ♂ that he flowered "each differed from the other slightly in flower and leaf, but all were *very bad C. venustum*, . . . while the mother plant was *C. venustum* Pardinum variety, a very good form." (In litt., September 20, 1897.) Mr. E. O. Orpett, of South Lancaster, Mass., U.S.A., informs me (in litt., September 24, 1897) that Mr. McWilliams's *C. Spicerianum* ♀ × *niveum* ♂ seedlings, which "came true *C. Spicerianum*, differed much in themselves, especially in some of them, being but poor forms, while the mother plant was a superb form that I have not seen equalled in other *C. Spicerianum*."

It is therefore evident that these curiosities were not produced without pollen, and we are consequently almost bound to conclude that they were caused by accidental self-fertilisation. It is difficult to say exactly how this happened, but Mr. Young tells me that at the time (1891) his *C. barbatum* ♀ *C. niveum* ♂ cross was made he did not remove the pollen masses of the seed parent *C. barbatum*; and a short time ago I observed a flower of *C. Spicerianum*, one pollen mass of which had fallen down, and had stuck on the edge of the stigma, with the result that a pod is now set. I have also frequently observed large spiders and smaller flies settled on and crawling over the pollen masses of *Cypripediums*, and it is just possible that the sticky pollen might be carried on to the stigma in this way. With regard to the pollen of the foreign species that was applied by hand, it would no doubt fertilise some of the ovules, but the *self-fertilised* seeds would have a better chance in the struggle for existence, and would grow away quicker and stronger in the earlier stages than

would the hybrids, especially those of *C. niveum* and *C. concolor* parentage, which are known to be slow and "miffy" growers; the weaker would have to go to the wall, and the stronger would survive.

HYBRIDS OF THE SECOND GENERATION.

Hybrid Orchids of the second and third generations are well known to differ much in variability from those of the first gene-



106.—*SOPHRO-CATTELEYA* × *EXIMIA* (*CATTELEYA* BOWRINGIANA ♀ × *SOPHRONITIS* GRANDIFLORA ♂).
(*Journal of Horticulture*.)

ration. Generally speaking, as we have seen, hybrids of the first generation are uniformly intermediate, having a narrow range of variation; whereas hybrids of the second and third generations are very variable indeed, having a wide range of variation, sometimes reverting wholly to the parent species or parent hybrid, and occasionally even resembling a collateral hybrid. The more hybrids are crossed with one another the

more related they become, and, consequently, reversions to hybrids of the first generation, and indeed to pure species, become more frequent. This of course acts as a reaction to variation. *

With regard to the nomenclature of hybrids of the second and succeeding generations, it is not necessary—indeed it would not be wise—to give each distinct cross a distinctive name (as should certainly be done in hybrids of the first generation), for it is manifest that with such extraordinary variations and reversions as occur from the same seed-pod in most hybrids beyond the first generation, nomenclature would be reduced to an absurdity by such a system. But each distinct form, if worthy of a name, should be given a popular English one, like a Rose or any other florist's flower. It would no doubt be a great convenience to all if such names were made up of one word only, and that a short one. On the other hand, in the interests of science, a careful record should be kept of the pedigree of each plant for future reference.

CURIOSITIES IN SECOND GENERATION HYBRIDS.

One of the most curious results on record in crossing Orchids is that of Mr. W. Grey, for Hon. Erastus Corning, at Albany, New York, U.S.A.

Mr. Grey crossed *C. × Godefroyæ* ♀ with pollen of *C. niveum*, and from the same seed-pod is said to have raised *C. concolor*, *C. niveum*, *C. × Godefroyæ*, *C. × G. leucochilum*, *C. × G. pure-white*, *C. bellatulum*, and nearly fifty intermediate forms. (*Orchid Review*, ii. p. 227.) At first sight this result appears incredible, but when we remember how closely allied are the two parents in both appearance and structure, not only to one another, but also to *C. concolor* and *C. bellatulum*, we are not so sure that it is impossible. The mother parent, *C. × Godefroyæ*, was formerly thought to be a species; but since it has been raised twice by hand from *C. concolor* × *C. bellatulum*, and all three are known to grow near to one another, we must, I think, consider it to be a natural hybrid.

Sir Charles Strickland, Bart., of Hildeney, Malton, Yorkshire, showed at Royal Horticultural Society, May 14, 1895, "three plants of *C. concolor* × *C. bellatulum* which closely resembled *C. × Godefroyæ*." One of these plants came into the possession

of Capt. Schofield, New Hall, Hey, Rawtenstall, Manchester, who says that "it would be impossible to separate it from a fine form of *C. × Godefroyæ*." (*Orchid Review*, v. p. 75.) Again, Mr. Statter, of Stand Hall, Whitefield, Manchester, showed at Temple Show, Royal Horticultural Society, 1897, *C. × concolor*, which "resembled a form of *C. × Godefroyæ* with a yellow ground, and from which it would be difficult to distinguish it." (*Gardeners' Chronicle*, June 5, 1897, p. 418.) We know that *C. concolor* and *C. × Godefroyæ* grow together in South Siam (*Garden*, 1885, p. 342), and that *C. bellatulum* has also been found in the same district (*Ridley Jour. Linn. Soc. Bot.* xxxii. (1896), p. 415), so that it is quite possible for the natural hybrid *C. × Godefroyæ* to result therefrom. The undoubted fact too that *C. × Godefroyæ* is only imported in small numbers tends to confirm this.

On June 15, 1897, Mr. H. Druce, of St. John's Wood, showed at Royal Horticultural Society *C. × "Mrs. Druce,"* raised from *C. niveum* ♀ × *C. bellatulum* ♂, "the flower of which resembled *C. × Godefroyæ*." (*Gardeners' Chronicle*, June 19, 1897, p. 411.) We have already seen that *C. concolor* × *C. bellatulum* has produced *C. × Godefroyæ*. These facts, therefore, suggest the idea that *C. niveum* is but a geographical—probably an island—form of *C. concolor*.

Viewed in this light Mr. Grey's curious record may not be so impossible as it seems. *C. × Godefroyæ* = (*C. concolor* + *C. bellatulum*). Therefore *C. × Godefroyæ* ♀ × *C. niveum* ♂ would represent (*C. concolor* + *C. bellatulum*) ♀ × *C. niveum* ♂.

We have seen that *C. niveum* and *C. concolor* are very closely allied, and we know from experience how extremely variable all hybrids are after the first generation, and how common reversions become, so that it may not be so impossible, after all, to raise *C. concolor*, *C. niveum*, *C. × Godefroyæ*, *C. × G. leucochilum*, *C. × G. pure-white*, *C. bellatulum*, and nearly fifty intermediate forms from *C. × Godefroyæ* ♀ × *C. niveum* ♂.

It would be very interesting if someone would repeat the above cross and carefully record the result.

As with hybrids between species, so it is with crosses between varieties of the same species. For instance, Mr. Norman Cookson crossed *Dendrobium nobile nobilium* ♀ with pollen of *D. n. Cooksoni*, and from the same seed-pod flowered "some

good forms of each parent variety (*i.e.* *D. n. nobilius* and *D. n. Cooksoni*), and a series of forms grading down to ordinary *D. nobile*." (*Orch. Rev.* iii. p. 168.) "In the progeny, all of which bear very fine flowers, no two are alike: a few are almost identical with *D. n. Cooksoni*, . . . a few are richly coloured like *D. n. nobilius*, one is a fine white near to *D. n. Schröderianum*, and all the forms and all the shades of colour are represented." (*Gard. Chron.* March 28, 1896, p. 391.)

We know from importations recently made by Messrs. Sander & Co. ("Lang Tang" vars.) that all these varieties of *D. nobile* grow together in their native home, and therefore it is reasonable to suppose that they frequently intercross, making their history a very mixed one. We cannot, therefore, be surprised at the result of Mr. Cookson's experiment: their history being so varied, their offspring tend to be as variable, the mixing by crossing and the unmixing by many nuclear divisions causing true reversions to occur from time to time.

Many curiosities of Orchid breeding have come to light during the past few years, but they are getting so numerous now that familiarity with them has bred indifference if not contempt. For instance, the raising of *Odontoglossum* seedlings used to be considered a rare curiosity, but recently more than half-a-dozen have flowered, and we hear of numbers of seedlings fast growing to maturity. Perhaps the most remarkable feature of the flowering of *Odontoglossum* hybrids raised by hand is the direct proof that they afford of the parentage of certain natural hybrids; and Mr. R. A. Rolfe, of Kew, has been making a special study of this interesting question with valuable results. Thus *O. crispum* ♀ × *O. luteopurpureum* raised by M. Leroy for Baron Rothschild, of Paris, has proved the parentage of *O.* × *Wilckeanum*; Messrs. Veitch's *O. nobile* ♀ × *O. triumphans* proved the parentage of *O.* × *excellens*; and Messrs. Linden's *O.* × *cirrhosum* ♀ × *O. Hallii* that of *O.* × *elegans*. While, on the other hand, we have the beautiful *O.* × *crispo-Hallii* raised by Mr. Cookson which cannot occur in a wild state, one parent growing in Colombia and the other in Ecuador.

The chief difficulty hitherto found in raising *Odontoglossums* has been the rearing of the seedlings. I myself have had thousands of good seeds which germinated but gradually died off.

STERILITY.

In other difficult subjects the trouble is to get pods to set at all; thus Mr. Cookson tells us that he has never been able to get a pod of good seed on *Dendrobium Bensoniæ*. (*Gard. Chron.* February 27, 1897, p. 134.) Many *Dendrobium* species seem difficult to fertilise, especially the evergreen section of the genus.

In 1892 Mr. W. H. White, for the President of the Royal Horticultural Society, Sir Trevor Lawrence, Bart., of Burford, pollinated over 100 flowers of *D. fimbriatum*, but not a single seed-pod was obtained. (*Orchid Rev.* i. p. 17.) Mr. F. Moore, of the Royal Infirmary, Liverpool, informs me that he has managed to set pods on the following *Dendrobiums* this year:—*D. aureum* ♀ × *D. crepidatum roseum* ♂, *D. nobile* ♀ × *D. Devonianum* ♂, *D. primulinum* ♀ × *fimbriatum oculatum* ♂, and *D. clavatum* ♀ × *D. crepidatum roseum* ♂ (in litt., Aug. 24, 1897).

The nigro-hirsute section of *Dendrobiums* are well known to be bad setters. Mr. R. Eichel, of Bradford, tells me that for eight years he has failed to cross *D. formosum* with pollen of the deciduous section, but he has now seedlings two-and-a-half months old of *D. formosum* ♀ × *D. nobile* from four seed-pods (in litt., Aug 15, 1897). This circumstance proves to us once more how misleading and unsatisfactory purely negative results are, and in this there is much hope for the future. However many times a cross has failed to set, we can never be sure that it may not be accomplished by someone. Very trifling conditions seem to affect the delicate and susceptible organs of reproduction, causing apparent sterility. For instance, it is said that *Epidendrum ciliare* can only be fertilised with success in the evening, when the flowers begin to emit their fragrant perfume. (*Orchid Rev.* v. p. 115.) (Mr. Harry Veitch tells me that this is not so with him.) Again, Mr. Eichel has found *E. vitellinum* very difficult to set seed, and still more difficult to raise plants; but Messrs. Veitch & Sons have flowered *E. radico-vitellinum*, and have a number of pods maturing at Langley. On the other hand Messrs. Veitch have failed to set a pod on *E. radicans*, whereas Mr. Eichel tells me he has plants up of *E. radicans* ♀ crossed with pollen of *E. Wallisii* and *Cattleya Bowringiana*; and Messrs. Sander have also plants up of *E. radicans* ♀ × *E. Wallisii*. (*Orch. Rev.* v. p. 301.)

Darwin cites some very remarkable curiosities in sterility, showing what slight causes affect the reproductive organs in the genus *Oncidium*. ("Animals and Plants," ii. pp. 114-116.) He shows from the observations and experiments of Dr. Fritz Müller in Brazil that at least nine species of *Oncidium*, including the well-known *O. flexuosum*, are perfectly self-sterile: they will not set seed if pollinated with pollen off the same plant, and yet they are perfectly fertile both in their pollen and their ovules when crossed with a distinct species, or, most curious of all, if pollinated with pollen of the same species but off a distinct individual plant. For instance, on the stigma of *O. flexuosum* Dr. Müller put the plant's own pollen side by side with pollen of another plant of the same species; in five days the latter was quite fresh and yellow, while the former was dark brown and decayed. Again, he placed on another stigma of *O. flexuosum* pollen of a distinct plant of the same species side by side with pollen from a distinct genus, *Epidendrum*: both behaved alike, and after eleven days could not be distinguished except by their caudicles. Dr. Müller also found that the self-sterile pollen not only turned brown and decayed itself, but that it also caused the surface of the stigma to decay.

A few experiments carried out by myself at home confirm those made by Dr. Müller in Brazil. I pollinated seventy-three flowers of *O. flexuosum* with their own pollen: the stigma-chamber folded itself up in every case and swelled slightly, but in a few days withered from the stalk upwards and dropped off. I had exactly the same result with *O. incurvum*, having pollinated many flowers. In all cases the pollen decayed quickly. It was different with *O. flexuosum* crossed with *O. Forbesii*: six flowers only were pollinated and two of them set pods, one of which burst prematurely and was full of chaffy seeds, while the other opened properly 133 days after pollination, and on examination was found to contain a few good plump seeds, which under the microscope appeared to be healthy living germs full of green colouring matter. The seeds were very small and round, hollowed out on one side, not unlike a shell: they were duly sown on April 12 of this year, but as yet show no signs of germination. I have also set three apparently good pods of *O. incurvum* crossed with *O. flexuosum*, which have not yet ripened.

Hand-raised hybrids of *Oncidium* do not seem to have been

flowered yet in this country, but I hope in the near future attempts to raise them will prove more successful.

THE INFLUENCE OF FOREIGN POLLEN ON THE RIPENING OF SEED-PODS.

In the *Orchid Review*, iv. p. 41, Mr. T. L. Mead, of Oviedo, Florida, U.S.A., writes:—"I note a great difference in the time required to ripen seed-pods, according to the species of pollen made use of: it seems to tend to a mean between the normal ripening time of the two parents." The writer gives several curious and interesting facts in support of his opinion, and in three cases at least there appears to be some ground for the theory. On the other hand, Mr. Cookson writes (*Orchid Review*, iv. p. 112):—"From careful observation I am strongly of opinion that the period necessary to produce fertile seed depends on the period usual with the mother parent, and that the male parent has little to do with it." In *Orchid Review*, iv. p. 326, Mr. Mead gives some exceptions to his former theory, and suggests that the influence of the foreign pollen may be individual rather than general. For instance, "*Lælia anceps* pollen seems invariably to cut down time needed to ripen pods of *Cattleya labiata* group by about six months; while the pollen of *C. labiata* does not appreciably lengthen the time needed by *L. anceps* pods to ripen. . . . *Broughtonia sanguinea*, which both with its own and with foreign pollen ripens its seeds in one-and-a-half to two months, has power to quicken the ripening of *C. Bowringiana*, with which it gave good seed in eight-and-a-half months."

It seems to me that in the foregoing instances one of the main factors in the period of ripening seed-pods has been overlooked, and that is the time of the year when these experiments were carried out. For instance, to take the case of *L. anceps*. On January 22, 1896, I pollinated *L. a. Sanderiana* with its own pollen; the seed-pod ripened good seed by June 15, 1896, or 145 days. On January 27, 1897, I crossed the same plant again with its own pollen, and it did not ripen its seed-pod until July 14, taking 169 days, showing a difference in period of ripening (for the same plant pollinated by same plant) of twenty-four days in two different years. This seems to show clearly that

altogether, apart from foreign pollen, there are other disturbing factors which must be taken into account when considering the



FIG. 107.—*SOPHRO-LÆLIO-CATTLEYA* × *VEITCHII* (*SOPHRONITIS GRANDIFLORA* ♀ × *LÆLIO-CATTLEYA* × *ELEGANS* ♂). (*Gardeners' Magazine*.)

causes of lengthening and shortening period of ripening of seed-pods in Orchids.

Mr. Reginald Young, of Sefton Park, Liverpool, has very kindly placed at my disposal a copy of his interesting stud-book,

containing a complete list of his crosses in the *Paphiopedium* group of *Cypripediums* from 1892 up to August 31, 1897. On referring to this I find that *Cypripedium barbatum* has been used twenty-two times as a seed parent, and has been crossed nearly the year round from December to September. In these twenty-two instances there was an extreme difference between the longest and shortest period of ripening (from pollination onwards) of 149 days, or about five months, the longest time being 315 days, or ten-and-a-half months, and the shortest period 166 days, or five-and-a-half months; so that the difference between the longest and the shortest was nearly as much as the whole time of the shortest period. A further examination of the facts and figures points to the conclusion that one of the chief causes of the extreme difference lies in the season of the year the cross was made, for the pod which ripened quickest was pollinated on June 24; while that which ripened slowest was pollinated on December 8; and between December and June, with a slight exception or two, there was a gradual shortening of the period of ripening, and from June to December a marked lengthening of that period. The average period of ripening for each month was as follows:—

December, 315 days; March, 234 days; April, 209 days; May, 216 days; June, 187 days; August, 210 days; September, 287 days. Thus it seems that the nearer to Midsummer the flower was pollinated the quicker the pod ripened, and the nearer to Christmas the slower the pod ripened; and I think that there can be little doubt that this was due to the influence of the sun at those different periods. Further it may be noted that the pod which ripened slowest was formed and matured between December 8 and October 19 of the following year; while the pod which ripened quickest was formed and matured between June 24 and December 7 of the same year. This seems to suggest that the power of the sun is more essential in the early stages of formation than at any other time. We have already seen from Dr. Hildebrandt's observations that in *Cypripediums* some four months elapse between pollination and actual fertilisation, so that we may reasonably conclude that the growth of the pollen tubes, and the consequent fertilisation of the ovules, is considerably hastened by the power of the sun; and I hope our Italian friends will make use of the golden opportunities of sunny Italy.

It is evident from this that any experiments undertaken to test the influence of foreign pollen on the period of pod ripening must be carried out under the same conditions of light and heat. On looking through Mr. Young's records I found twenty plants that had been crossed, which fairly well corresponded with the above conditions. Each plant carried two pods (except one, and that had three), which were both crossed at the same time, and thus each pair of pods would be under fairly equal conditions all round. I have tabulated the results as follows:—

EACH PAIR CROSSED WITH THE SAME SPECIES OR HYBRID.

Seed Parent	Pollen Parent	Pollinated	Pod Ripened
<i>C. javanicum</i> . .	<i>C. × Godefroyæ</i> .	Aug. 9, 1893 .	May 29, 1894
	<i>C. × Godefroyæ</i> .	Aug. 9, 1893 .	May 29, 1894
<i>C. barbatum</i> . .	<i>C. niveum</i> . . .	June 4, 1894 .	Dec. 24, 1894
	<i>C. niveum</i> . . .	June 4, 1894 .	Dec. 24, 1894
<i>C. × superciliare</i> .	<i>C. bellatulum</i> . .	June 15, 1894	Jan. 29, 1895
	<i>C. bellatulum</i> . .	June 15, 1894	Jan. 29, 1895
<i>C. × oenanthum</i> .	<i>C. bellatulum</i> . .	July 23, 1894 .	Feb. 6, 1895
	<i>C. bellatulum</i> . .	July 23, 1894 .	Feb. 6, 1895
<i>C. × Ashburtoniæ</i> .	<i>C. bellatulum</i> . .	July 23, 1894 .	April 15, 1895
	<i>C. bellatulum</i> . .	July 23, 1894 .	April 15, 1895
<i>C. × calophyllum</i> .	<i>C. bellatulum</i> . .	July 23, 1894 .	April 22, 1895
	<i>C. bellatulum</i> . .	July 23, 1894 .	April 22, 1895
<i>C. × Harrisianum</i> .	<i>C. niveum</i> . . .	Sept. 14, 1894	Aug. 13, 1895
	<i>C. niveum</i> . . .	Sept. 14, 1894	Aug. 13, 1895
<i>C. × Harrisianum</i> .	<i>C. Sanderianum</i> .	Sept. 14, 1894	July 25, 1895
	<i>C. Sanderianum</i> .	Sept. 14, 1894	Aug. 7, 1895 (13 days)
<i>C. barbatum</i> . .	<i>C. niveum</i> . . .	May 29, 1895 .	Dec. 7, 1895
	<i>C. niveum</i> . . .	May 29, 1895 .	Dec. 7, 1895
<i>C. venustum</i> . .	<i>C. × nitens</i> . . .	Dec. 14, 1895 .	Dec. 2, 1896
	<i>C. × nitens</i> . . .	Dec. 14, 1895 .	Dec. 2, 1896
<i>C. Appletonianum</i>	<i>C. callosum</i> . . .	Jan. 15, 1896 .	Dec. 16, 1896
<i>Poyntzianum</i> .	<i>C. callosum</i> . . .	Jan. 15, 1896 .	Dec. 16, 1896
<i>C. Lawrenceanum</i> .	<i>C. Mastersianum</i> .	March 27, 1896	Nov. 18, 1895
	<i>C. Mastersianum</i> .	March 27, 1896	Nov. 18, 1896
<i>C. bellatulum</i> . .	<i>C. × Harrisianum</i>	May 26, 1896 .	Dec. 3, 1896
	<i>C. × Harrisianum</i>	May 26, 1896 .	Dec. 3, 1896

In the above list we have thirteen plants, each bearing a pair of pods, each pollinated on the same day, and each pollinated by one species or hybrid, the result being that every pair but one ripened on the same day; while in the exceptional pair there is a difference of thirteen days between the ripening of each pod, notwithstanding that the "pollen was taken from the same plant, same scape, and probably the same flower" (in litt., August 14, 1897).

EACH PAIR POLLINATED WITH TWO DIFFERENT SPECIES OR HYBRIDS.

Seed Parent	Pollen Parent	Pollinated	Pod Ripened	Difference
C. × calophyllum .	C. Chamberlainianum	Dec. 8, 1894	Oct. 31, 1895	0
	C. Spicerianum . .	Dec. 8, 1894	Oct. 31, 1895	
C. × Leeaenum . .	C. × ænanthum . .	Jan. 1, 1895	Nov. 25, 1895	12 days
	C. Boxalli	Jan. 1, 1895	Dec. 7, 1895	
C. × nitens . . .	C. × Canhamii . .	Dec. 14, 1895	Sept. 7, 1896	63 days
	C. × ænanthum . .	Dec. 14, 1895	Nov. 9, 1896	
C. × Williamsianum	C. × Calypso . . .	Jan. 15, 1896	Sept. 26, 1896	0
	C. Boxalli	Jan. 15, 1896	Sept. 26, 1896	
C. bellatulum . .	C. Curtisii	May 26, 1896	Mar. 17, 1897	22 days
	C. ciliolare	May 26, 1896	Feb. 23, 1897	
C. niveum	C. × Rittelii . . .	May 26, 1896	April 9, 1897	31 days
	C. barbatum	May 26, 1896	Mar. 9, 1897	

In the above list we have six plants, bearing each a pair of pods, each pair pollinated on the same day, but each pair with two different species of pollen. The results are very interesting. Four out of the six ripened differently in each pair, the period varying from twelve to sixty-three days; in the other two each pair ripened together. The most curious and puzzling result of all was a plant of *C. Lawrenceanum* which carried three pods: two crossed with *C. Sanderianum* and one with *C. niveum*, all on the same day. There was a difference of fifteen days in the two pods crossed with *C. Sanderianum*, though the pollen was taken from the "same plant, same scape, and same flower"; while, strangely enough, the pod crossed with *C. niveum* ripened on the same day as one of those crossed with *C. Sanderianum*.*

* *C. Sanderianum* was also the pollen parent in the one exception on p. 463.—ED.

Looking at these twenty instances as a whole, it seems quite possible that the pollen parent has some influence on the period of ripening of the seed-pod, though to what extent is not quite clear.

Further experiments and observations are necessary before we can venture to determine the question definitely.

CROSSES BETWEEN DIFFERENT GENERA.

In 1887 Mr. R. A. Rolfe, of Kew, read a valuable paper before the Linnean Society on "Bigeneric Orchid Hybrids" (*Journ. Linn. Soc.* xxiv. 160, p. 156). In this paper Mr. Rolfe gave a complete list of generic hybrids which had flowered up to 1887, and their number was then fifteen all told. A decade has passed away since then, and the small band of fifteen has increased in number to 118; and of these thirty-seven are generic hybrids of the second generation, and one of these is a trigeneric hybrid containing three genera.

I have prepared a list of generic hybrids made up to date, with a reference to each, and the name of the original raiser.

LIST OF GENERIC ORCHID HYBRIDS.

(a) FLOWERED HYBRIDS.

(1) *Cattleya* × *Lælia* (*Lælio-Cattleya* ×).

- L.-C. × *albanensis* (L. *grandis* ♀ × C. *Warneri*), *Lindenia* t. 466, Linden.
- L.-C. × *Amesiana* (L. *crispa* ♀ × C. *maxima*), *Gard. Chron.* 1884, i. p. 109, Veitch.
- L.-C. × *Aphrodite* (C. *Mendelii* ♀ × L. *purpurata*), R.H.S., June 11, 1895, Lee.
- L.-C. × *Ascania* (C. *Trianae* ♀ × L. *Xanthina*), R.H.S., April 25, 1893, Veitch.
- L.-C. × *Astoriae* (C. *Gaskelliana* ♀ × L. *Xanthina*), R.H.S., Feb. 13, 1894, Sander.
- L.-C. × *Aurora* (L. *Dayana* ♀ × C. *Loddigesii*), *Gard. Chron.* Oct. 5, 1889, Veitch.
- L.-C. × *belairensis* (C. *Bowringiana* ♀ × L. *autumnalis*), R.H.S., Oct. 27, 1896, Mantin.
- L.-C. × *bella* (L. *purpurata* ♀ × C. *labiata*), *Gard. Chron.* 1884, i. p. 174, Veitch.
- L.-C. × *Boylei* (C. *Trianae* ♀ × L. *anceps*), R.H.S., May 23, 1894, Sander.
- L.-C. × *Bryani* (C. *Gaskelliana* ♀ × L. *crispa*), R.H.S., Sept. 8, 1896, Cookson.
- L.-C. × *callistoglossa* (L. *purpurata* ♀ × C. *Warszewiczii*), *Gard. Chron.* 1882, i. p. 76, Veitch.
- L.-C. × *Canhamiana* (L. *purpurata* ♀ × C. *Mossiae*), *Gard. Chron.* 1885, ii. p. 6, Veitch.
- L.-C. × *Clivei* (C. *Dowiana* ♀ × L. *pumila*), R.H.S., Aug. 29, 1893, Cookson.
- L.-C. × *Cornelia* (L. *pumila* ♀ × C. *labiata*), R.H.S., Nov. 28, 1893, Veitch.
- L.-C. × *Crispo-Warneri* (C. *Warneri* ♀ × L. *crispa*), R.H.S., Nov. 13, 1894, Cowper.
- L.-C. × *Decia* (L. *Perrinii* ♀ × C. *Dowiana*), R.H.S., Oct. 27, 1894, Veitch.

- L.-C. × *Devoniensis* (L. *crispa* ♀ × C. *guttata*), R.H.S., Sept. 22, 1863, Veitch.
 L.-C. × *Doris* (L. *harpophylla* ♀ × C. *Trianae*), *Orch. Rev.* ii. p. 79, Cookson.
 L.-C. × *Electra* (C. *Percivaliana* ♀ × L. *purpurata*), R.H.S., June 9, 1896, Ingram.
 L.-C. × *Elsteadensis* (C. *bicolor* ♀ × L. *xanthina*), R.H.S., Aug. 13, 1895, Ingram.
 L.-C. × *Epicasta* (L. *pumila* ♀ × C. *Warszewiczii*), R.H.S., Aug. 29, 1893, Veitch.
 L.-C. × *Eumæa* (C. *Trianae* ♀ × L. *majalis*), R.H.S., Oct. 24, 1893, Veitch.
 L.-C. × *Eunomia* (L. *Dayana* ♀ × C. *Gaskelliana*), R.H.S., Sept. 10, 1895, Veitch.
 L.-C. × *eximia* (C. *Warneri* ♀ × L. *purpurata*), R.H.S., June 24, 1890, Veitch.
 L.-C. × *exoniensis* (C. *Mossiae* × L. *crispa*), *Gard. Chron.* 1867, p. 1144, Veitch.
 L.-C. × *Ghislainiae* (L. *harpophylla* ♀ × C. *amethystoglossa*), *Orch. Rev.* iv. p. 39, Imshoort.
 L.-C. × *Hippolyta* (L. *cinnabarina* ♀ × C. *Mossiae*), R.H.S., March 29, 1890, Ingram.
 L.-C. × *Highburiensis* (C. *Lawrenceana* ♀ × L. *cinnabarina*), R.H.S., April 7, 1896, Chamberlain.
 L.-C. × *Horner* (L. *Perrinii* × C. *Percivaliana*), R.H.S., Nov. 10, 1896, Ingram.
 L.-C. × *Hyeana* (L. *purpurata* ♀ × C. *Lawrenceana*), Soc. Roy. Flor. Brux. Terv., May 9, 1897, Hye.
 L.-C. × *Ingramiana* (L. *purpurata* ♀ × C. *Dowiana*), R.H.S., April 7, 1896, Ingram.
 L.-C. × *Ingramii* (L. *Dayana* ♀ × C. *Dowiana*), R.H.S., July 13, 1892, Ingram.
 L.-C. × *intermedio-flava* (C. *intermedia* × L. *flava*), *Orch. Hyb.* p. 265, Fournier.
 L.-C. × *Marriottiana* (L. *flava* ♀ × C. *Skinneri*), R.H.S., April 12, 1892, Marriott.
 L.-C. × *Maynardii* (L. *Dayana* ♀ × C. *Walkeriana*), R.H.S., Feb. 14, 1893, Sander.
 L.-C. × *Measuresii* (L. *xanthina* ♀ × C. *dolosa*), R.H.S., July 24, 1897, Sander.
 L.-C. × *Meteor* (L. *Dayana* × C. *Bowringiana*), R.H.S., Nov. 10, 1896, Ingram.
 L.-C. × *Minerva* (L. *Perrinii* × C. *Lawrenceana*), R.H.S., Nov. 10, 1896, Ingram.
 L.-C. × *Myra* (C. *Trianae* ♀ × L. *flava*), R.H.S., March 12, 1895, Veitch.
 L.-C. × *Mylamiana* (C. *granulosa* ♀ × L. *crispa*), *Gard. Chron.* 1876, ii. p. 740.
 L.-C. × *Nysa* (L. *crispa* ♀ × C. *Warszewiczii*), R.H.S., Aug. 25, 1891, Veitch.
 L.-C. × *olivetensis* (L. *pumila* × C. *Leopoldi*), Soc. Nat. Hort. France, July 22, 1897, Mantin.
 L.-C. × *Pallas* (L. *crispa* ♀ × C. *Dowiana*), R.H.S., Dec. 10, 1889, Veitch.
 L.-C. × *Parysatis* (C. *Bowringiana* ♀ × L. *pumila*), *Orch. Rev.* ii. p. 310, Veitch.
 L.-C. × *Pisandra* (L. *crispa* ♀ × C. *Eldorado*), R.H.S., Oct. 24, 1893, Veitch.
 L.-C. × *Proserpine* (L. *Dayana* ♀ × C. *velutina*), *Gard. Chron.* 1890, p. 352, Veitch.
 L.-C. × *Reginæ* (L. *purpurata* ♀ × C. *Forbesii*), Soc. Nat. Hort. Fr., July 22, 1897, Mantin.
 L.-C. × *Roeblingii* (L. *purpurata* ♀ × C. *Gaskelliana*), R.H.S., June 25, 1895, Sander.
 L.-C. × *Rothschildiæ* (L. *Perrinii* ♀ × C. *Warszewiczii*), *Orch. Rev.* iii. p. 353, Veitch.
 L.-C. × *Sallieri* (L. *purpurata* × C. *Loddigesii*), *Journ. des Orch.* vii. p. 290, Maron.
 L.-C. × *Semiramis* (L. *Perrinii* ♀ × C. *Gaskelliana*), R.H.S., Nov. 12, 1895, Veitch.
 L.-C. × *Schroderæ* (C. *Trianae* ♀ × L. *Jongheana*), R.H.S., Aug. 23, 1892, Schröder.
 L.-C. × *Statteriana* (L. *Perrinii* ♀ × C. *labiata*), *Gard. Chron.* Nov. 14, 1893, Veitch.
 L.-C. × *Timora* (L. *Dayana* ♀ × C. *Lueddemanniana*), *Gard. Chron.* Oct. 8, 1887, Veitch.
 L.-C. × *Tresederiana* (C. *Loddigesii* ♀ × L. *crispa*), *Gard. Chron.* Feb. 4, 1888, Treseder.

- L.-C. \times Tydea (L. pumila \varnothing \times C. Trianæ), R.H.S., Feb. 13, 1894, Veitch.
 L.-C. \times Vedasti (L. pumila \varnothing \times C. Loddigesii), *L'Orchid.* Feb. 1896, Perrenond.
 L.-C. \times Veitchiana (C. labiata \times L. crispa \varnothing), *Gard. Chron.* 1874, i. p. 566, Veitch.
 L.-C. \times Zephyra (C. Mendelii \varnothing \times L. xanthina), R.H.S., July 24, 1894, Veitch.

In addition to the above there are thirty-six Hybrid Lælio-Cattleyas of the second generation (*i.e.* Lælio-Cattleya \times Lælia and Lælio-Cattleya \times Cattleya). For references see Hansen's *Orchid Hybrids*, pp. 85, 249, 258.

(2) *Cattleya* \times *Sophronitis* (*Sophro-Cattleya* \times).

- S.-C. \times Batemaniana (S. grandiflora \varnothing \times C. intermedia), *Gard. Chron.* Aug. 28, 1886, Veitch.
 S.-C. \times Calypso (S. grandiflora \varnothing \times C. Loddigesii), *Gard. Chron.* Nov. 22, 1890, Veitch. (Fig. 105.)
 S.-C. \times eximia (C. Bowringiana \varnothing \times S. grandiflora), R.H.S., Sept. 24, 1894, Veitch. (Fig. 106.)

(3) *Cattleya* \times *Brassavola* (*Brasso-Cattleya* \times).

- B.-C. \times Digbyano-Mossiae (C. Mossiae \varnothing \times B. Digbyana), *Gard. Chron.* June 15, 1889, Veitch.
 B.-C. \times Digbyano-Trianæ (C. Trianæ \varnothing \times B. Digbyana), R.H.S., April 3, 1897, Veitch. (Fig. 112.)

(4) *Cattleya* \times *Epidendrum* (*Epi-Cattleya* \times).

- E.-C. \times matutina (C. Bowringiana \varnothing \times E. radicans), R.H.S. March 23, 1897, Veitch. (Fig. 108.)

(5) *Lælia* \times *Sophronitis* (*Sophro-Lælia* \times).

- S.-L. \times læta (L. Dayana \varnothing \times S. grandiflora), R.H.S., Oct. 9, 1894, Veitch.
 S.-L. \times Marriotti (S. grandiflora \varnothing \times L. flava), R.H.S., Nov. 24, 1896, Marriott.

(6) *Lælia* \times *Epidendrum* (*Epi-Lælia* \times).

- E.-L. \times belairensis (L. autumnalis \varnothing \times E. ciliare), *Cogn. Chron. Orch.* 1897, p. 53, Mantin.
 E.-L. \times Hardyana (E. ciliare \varnothing \times L. anceps), R.H.S., Nov. 13, 1894, Rothschild. (Fig. 109.)
 E.-L. \times radico-purpurata (L. purpurata \varnothing \times E. radicans), R.H.S., July 27, 1897, Veitch.

(7) *Sophronitis* \times *Epidendrum* (*Epiphronitis* \times).

- E.-S. \times Veitchii (S. grandiflora \varnothing \times E. radicans), R.H.S., June 24, 1890, Veitch

(8) *Phaius* \times *Calanthe* (*Phaio-Calanthe* \times).

- P.-C. \times Berryana (P. Humbloti \varnothing \times C. Masuca), R.H.S., Nov. 26, 1895, Sander.
 P.-C. \times Brandtiae (P. Wallichii \varnothing \times C. \times Veitchii), R.H.S., Feb. 9, 1897, Sander.
 P.-C. \times insperata (P. grandifolius \varnothing \times C. Masuca), *Man. Orch.* 1894, p. 146, Veitch.
 P.-C. \times irrorata (P. grandifolius \varnothing \times C. vestita), *Gard. Chron.* 1867, p. 264, Veitch.
 P.-C. \times Sedeniana (P. grandifolius \varnothing \times C. \times Veitchii), *Gard. Chron.* Feb. 1887, Veitch.

(9) *Zygopetalum* × *Colax* (*Zygo-Colax* ×).

Z.-C. × *leopardinus* (Z. *maxillare* ♀ × C. *jugosus*), *Gard. Chron.* 1886, p. 199, Veitch.

Z.-C. × *Veitchii* (Z. *erinitum* ♀ × C. *jugosus*), *Gard. Chron.* i. p. 765, 1887, Veitch. (Fig. 110.)

(10) *Anæctochilus* × *Hæmaria* (*Anæctomaria* ×).

A. × *Domini* (A. *Lobbianus* ♀ × H. *discolor*), *Proc. R.H.S.* v. 1865, p. 139, Veitch.

(11) *Hæmaria* × *Macodes* (*Macomaria* ×).

M. × *Veitchii* (H. *discolor* ♀ × M. *Petola*), *Proc. R.H.S.* ii. 1862, p. 546, Veitch.

(12) *Hæmaria* × *Dossinia* (*Dossinimaria* ×).

D. × *Dominii* (H. *discolor* ♀ × D. *marmorata*), *Gard. Chron.* 1861, p. 531, Veitch.

(13) *Sophronitis* × *Lælio-Cattleya* × (*Sophro-Lælio-Cattleya* ×).

S.L.C. × *Veitchii* (S. *grandiflora* ♀ × L.-C. × *elegans*), *R.H.S.*, Sept. 6, 1892, Veitch. (Fig. 107.)

(b) GENERIC CROSSES FLOWERED MOTHER GENUS.

(1) *Zygopetalum* × *Odontoglossum*.

Z. *Mackayi* ♀ × O. *bietonense*, Seden for Veitch (in litt., Sept. 25, 1897).

Z. *Mackayi* ♀ × O. *crispum*, Seden for Veitch (in litt., Sept. 25, 1897).

Z. *Mackayi* ♀ × O. *grande*, Seden for Veitch (in litt., Sept. 25, 1897).

Z. *Mackayi* ♀ × O. *nobile* (*Pescatorei*), Seden for Veitch (in litt., Sept. 25), 1897; Treseder for Heath (in litt., Sept. 4, 1897).

(2) *Zygopetalum* × *Oncidium*.

Z. *Mackayi* ♀ × O. *unguiculatum*, Eichel (in litt., June, 1897) (*cf.* Horner, in litt., Sept. 9, 1897).

(3) *Zygopetalum* × *Lycaste*.

Z. *Mackayi* ♀ × L. *Skinneri*, Seden for Veitch (in litt., Sept. 25, 1897).

(All the above flowered *Zygopetalum Mackayi* pure and simple.)

(4) *Phragmipedium* × *Paphiopedium*.

(South American × East Indian *Cypripedium*.)

Phrag. *longifolium* ♀ × Paph. *Stonei*, Grey in *Orch. Hyb.* p. 189.
(Flowered Phrag. *longifolium*.)

(c) UNFLOWERED HYBRIDS.

Bletia × *Lælia* (B. *verecunda* ♀ × L. *purpurata*), Mead, *Orch. Rev.* iv. p. 42.

Bletia × *Schomburgia* (B. *verecunda* ♀ × S. *tibicinis*), Mead, *Orch. Rev.* iv. p. 42.

Bletia × *Phaius* (B. *catenulata* ♀ × P. *grandifolius*), Hodgkinson, *Orch. Rev.* iv. p. 334.

Bletia × *Cælogyne* (B. *hyacintha* ♀ × C. *cristata*), Eichel, *Orch. Rev.* v. p. 140 (Moore, in litt., Aug. 31, 1897).

- Epidendrum* × *Phaius* (*E. atropurpureum* ♀ × *P. grandifolius*), Berkeley, *Orch. Hyb.* p. 322.
- Epidendrum* × *Zygopetalum* (*Z. Mackayi* ♀ × *E. ciliare*), Horner in *Garden*, Nov. 2, 1892.
- Epidendrum* × *Dendrobium* (*E.* × *O'Brienianum* ♀ × *D. crystallinum*), *Orch. Rev.* ii. p. 292, Statter.
- Cattleya* × *Sobralia* (*S. macrantha* ♀ × *C. Warscewiczii*), Chamberlain, *Orch. Rev.* i. p. 366.
- Sophronitis* × *Brassavola* (*S. grandifolia* ♀ × *B. glauca*) (Orpet, in litt., Sept. 1897).
- Maxillaria* × *Lycaste* (*M. Sanderiana* ♀ × *L. Skinneri*) (Eichel, in litt., Sept. 1897).
- Diacrium* × *Epidendrum* (*D. bicornutum* ♀ × *E. radicans*), Sander, *Orch. Rev.* v. p. 301.
- Cattleya* × *Phragmipedium* (Charlesworth, in litt., Oct. 1897).
- Laelia* × *Phragmipedium* (*L. cinnabarina* ♀ × *P.* × *Sedeni*) (Eichel, in litt., Sept. 1897 [3 lots]).
- Paphiopedium* × *Cypripedium* (*E. Indian* × Hardy *Cypripedium*) (*P. Lawrenceanum* ♀ × *C. spectabile*), Fröbel, *Gard. Chron.* Oct. 2, 1897.

Paphiopedium × *Phragmipedium*.

(*E. Indian* × *S. Americ. Cypripedium*.)

- Paph. Curtisi* ♀ × *Phrag. longifolium*, Marwood, *Gard. Chron.* July 8, 1893.
- Phrag. caudatum* ♀ × *Paph. barbatum*, Veitch, R.H.S., May 12, 1885.
- Paph. callosum* ♀ × *Phrag. caudatum*, Lutwyche, *Orch. Rev.* ii. p. 19.
- Paph. Parishii* ♀ × *Phrag. caricinum*, Swan, *Orch. Rev.* ii. p. 171.
- Phrag.* × *Sedeni* ♀ × *Paph. Stonei* [(1) Statter, in litt., Aug. 1897]; (2) Hurst, Oct. 1897.
- Paph. Spicerianum* ♀ × *Phrag. Schlimii*, Hurst, 1897.
- Paph. Spicerianum* ♀ × *Phrag.* × *Sedeni*, Treseder, *Orch. Hyb.* p. 188.
- Phrag.* × *Dominianum* ♀ × *Paph. Chamberlainianum*, Swinburne, *Gard. Chron.* Oct. 1896, p. 435.
- Paph.* × *Ashburtoniae* ♀ × *Phrag.* × *calurum*, Winn, 1896.
- Paph. venustum* ♀ × *Phrag. Schlimii*, Winn, 1896.
- Paph. bellatulum* ♀ × *Phrag.* × *Sedenii*, Winn, 1896.
- Phrag.* × *cardinale* ♀ × *Paph. Spicerianum*, Hurst, Oct. 1897.

(d) GOOD SEEDS.

- Cattleya* × *Broughtonia* (*C. Bowringiana* ♀ × *B. sanguinea*), Mead, *Orch. Rev.* iv. p. 326.
- Epidendrum* × *Odontoglossum* (*E. vitellinum* ♀ × *O. crispum*), Eichel, *Orch. Rev.* v. p. 115.
- Bletia* × *Calanthe* (*B. hyacintha* ♀ × *C. Masuca*), Veitch, *Orch. Conf.* 1885.
- Acanthepippium* × *Chysis* (*A. Curtisi* ♀ × *C. bractescens*), Veitch, *Orch. Conf.* R.H.S., 1885, p. 35.
- Chysis* × *Mormodes* (*C. aurea* ♀ × *M. Pardinum*) (Moore, in litt., August, 1897).
- Chysis* × *Zygopetalum* (*C. aurea* ♀ × *Z.* × *Sedeni*), Veitch, *Orch. Conf.* 1885.
- Laelia* × *Paphiopedium* (*L. cinnabarina* ♀ × *Paph. Boxalli*) (Eichel, in litt., Sept. 1897).
- Paphiopedium* × *Cypripedium* (*E. Indian* × Hardy *Cypripedium*), *P. Exul* ♀ × *C. Calceolus*, Hurst, *Orch. Rev.* v. p. 365.
- Cypripedium* × *Phragmipedium* (Hardy × *S. American Cypripedium* (*C. Calceolus* ♀ × *Phrag.* × *Sedeni*), Hurst, *Orch. Rev.* v. p. 365.

CURIOUS GENERIC HYBRIDS.

(1) *Sophronitis* \times *Epidendrum*.—*Epiphronitis* \times *Veitchii* is an interesting hybrid out of *Sophronitis grandiflora* ♀ by *Epidendrum radicans* ♂. It was first raised and flowered by Mr. Seden for Messrs. Jas. Veitch & Sons in 1890. The parents of this hybrid not only belong to distinct genera, but are markedly different both in size and habit, the father parent growing as many feet high as the mother parent grows in inches; the former a native of Mexico and Guatemala, and the latter of Southern Brazil. The hybrid is more curious still, the influence of the *Epidendrum* parent being overwhelming; the reed-like stems, with air-roots, show no trace of the *Sophronitis* parent, being exactly like *Epidendrum*, and in the flower there is hardly a trace of the peculiar structure of *Sophronitis*; but, on the other hand, one can see at a glance that some modifying influence has been at work: the flowers are darker in colour, the pedals are broader, the lip is less toothed, broader, and not so deeply cleft, the crest has more yellow colour, two smaller tubercles, and a shorter keel—all of which are consistent with the influence of *Sophronitis*. But anyone not knowing the parentage of the hybrid would call it a large-flowered and highly coloured form of *Epidendrum radicans* (col. fig. "Revue Horticole," October 16, 1896, p. 480).

(2) *Cattleya* \times *Epidendrum*.—*Epi-Cattleya* \times *matutina* is a curious hybrid out of *Cattleya Bowringiana* ♀ by *Epidendrum radicans* ♂. (Fig. 108.) It was raised and flowered by Mr. Seden for Messrs. Jas. Veitch & Sons, and was shown in March 23, 1897. Like *Epiphronitis* \times *Veitchii*, this hybrid closely resembles *Epidendrum radicans* both in habit and flowers, there being but few traces of the mother parent *Cattleya-Bowringiana*. But it is said that the reed-like stems show a slight tendency to thicken at the base; the colour of the sepals and petals, too, is much lighter than in *Epidendrum radicans*, being yellow tinged with vermilion; the lip is broader, ovate, and notched instead of three-lobed and toothed; otherwise the hybrid would easily pass for a large-flowered and light-coloured form of *Epidendrum radicans*.

(3) *Lælia* \times *Epidendrum*.—*Epi-Lælia* \times *radico-purpurata* is a beautiful hybrid of the same class out of *Lælia purpurata* ♀ by *Epidendrum radicans* ♂, and like the other two was raised by Mr. Seden for Messrs. Jas. Veitch & Sons, and was shown



FIG. 108.—EPI-CATTELEYA × MATUTINA (CATTELEYA BOWRINGIANA ♀ × EPIDENDRUM RADICANS ♂).
(Gardeners' Chronicle.)

at R.H.S. on July 27, 1897. This hybrid again shows the predominating influence of the *Epidendrum* parent, though the *Lælia* parent is rather more perceptible than in either *Epiphronitis* × *Veitchii* or *Epi-Cattleya* × *matutina*. The reed-like habit and the adnate column are those of *Epidendrum*, while traces of the *Lælia* are to be seen in the slightly recurved leaves, larger flowers, sepals and petals modified in colour to a light flame yellow; the lip is broadly ovate and nearly entire with a broad band of purple around two lemon yellow eyes, with a three-keeled crest between. Thus in essential structure the hybrid corresponds with *Epidendrum radicans*, yet from a horticultural point of view it is far superior in every way.

In all three hybrids, between *Sophranitis* and *Epidendrum*, *Cattleya* and *Epidendrum*, and *Lælia* and *Epidendrum*, we find the *Epidendrum* parent so largely and overwhelmingly the predominant partner that did we not know we could never have guessed the other parent.

It will be noticed that the *Epidendrum* parent is the same species (*E. radicans*) in each of the three cases, and at first sight it might be thought that this species was, in some way or other, naturally prepotent over other species; but we know that this is not so, for when *E. radicans* is crossed with *E. xanthinum* the offspring *E. × Dellense* is intermediate in character, slightly inclining to *E. xanthinum* (*Orch. Rev.* i. p. 324); and *E. radicans* crossed with *E. evectum* produces *E. × O'Brienianum*, the colour of which is intermediate, but the shape resembling *E. evectum* (*Orch. Rev.* i. p. 227). It is evident, therefore, that *E. radicans* is not always predominant when used as a parent.

The genus *Epidendrum* contains a large number of species, which fall naturally into at least two distinct groups.

(1) *Eu-epidendrum* of Bentham and Hooker, "Genera Plantarum," iii. p. 529 (1883). (a) Column and lip wholly adnate; (b) Stems reed-like.

(2) Other groups of Bentham. (a) Column and lip partly adnate; (b) stems thickened or swollen into pseudo-bulbs.

It will be noted that these two groups are very distinct in structure, almost distinct enough to be classed as two genera; and further it is apparent that both in freedom of column and lip and in swollen stems the second group approaches *Lælia*,



FIG. 109.—EPI-LÆLIA × HARDYANA (EPIDENDRUM CILIARE ♀ × LÆLIA ANCEPS ♂). (Gardeners' Chronicle)

Cattleya, and Sophronitis, forming as it were a connecting link between them and the reed-like Epidendra. Indeed, recent results of hybridisation seem to show that the second group of Epidendrum is more closely allied to Cattleya, Lælia, and Sophronitis than to the first group. Thus *E. ciliare* of the second group when crossed with *Lælia anceps* and *L. autumnalis* produces ordinary hybrids fairly intermediate in character (*Epi-Lælia* × *Hardyana* and *E.-L.* × *belairensis* respectively); whereas when *E. vitellinum* of the second group is crossed with *E. radicans* of the first group the result is similar to crossing *E. radicans* with *Sophronitis*, *Cattleya*, and *Lælia*—namely, a slightly modified *E. radicans* (the only traces of the mother parent *E. vitellinum* being a slightly glaucous tint of the leaves, a tendency of the reed-like stems to enlarge at the nodes, together with irregularly modified flowers *E. × radico-vitellinum* O'Brien, *Gard. Chron.* July 10, 1897, p. 16).

To sum up briefly we find that—

(1) *Cattleya*, *Lælia*, *Sophronitis*, and the pseudo-bulbous *Epidendra* when intercrossed produce normal hybrids intermediate in character.

(2) The reed-like *Epidendra* when united with one another also produce ordinary hybrids intermediate in character.

(3) But when the reed-like *Epidendra* are crossed with the pseudo-bulbous *Epidendra* or with *Cattleya*, *Lælia*, and *Sophronitis* abnormal hybrids are produced having the essential characters of the reed-like *Epidendra*.

And, having regard to recent researches into the nature of fertilisation, we are almost bound to conclude that *Cattleya*, *Lælia*, *Sophronitis*, and the pseudo-bulbous *Epidendra* contain in their germ-cells some nuclear particles of the reed-like *Epidendra*.

These remarkable curiosities in Orchid breeding therefore go far to prove that not only are the pseudo-bulbous *Epidendra* (like *E. vitellinum*) descended from a reed-like *Epidendrum* ancestor, but that it is highly probable that *Sophronitis grandiflora*, *Lælia purpurata*, and *Cattleya Bowringiana* are also so descended.

This opens up a wide field for the student of evolution—a field into which we cannot enter now, being beyond the scope of these notes.

PREPOTENT GENERIC CROSSES.

Certain crosses between distinct genera have, curiously enough, flowered the same genus and species as their mother parent. The following is a complete list so far as I have been able to ascertain:—

PHRAGMIPEDIUM × PAPHIOPEDIUM.

(South American *Cypripedium* × E. Indian *Cypripedium*.)

- (1) *Phrag. longifolium Hartwegii* ♀ × *Paph. Stonei* ♂.

Raised by Mr. R. M. Grey for Mr. Graves, Orange, Mass. "The plant resembled the seed-bearing parent very closely." (Hansen, "Orchid Hybrids," p. 189.)

ZYGOPETALUM × ODONTOGLOSSUM.

- (1a) *Z. Mackayi* ♀ × *O. nobile (Pescatorei)* ♂.

"A few seedlings raised by Mr. Seden for Messrs. J. Veitch & Sons, all of which flowered pure *Z. Mackayi*." (In litt., September 25, 1897.)

(1b) The same cross was made by Mr. Treseder at Messrs. Heath & Son, of Cheltenham. "About 300 seedlings were raised, and about twenty plants flowered pure *Z. Mackayi*." (In litt., September 4, 1897.)

- (2) *Z. Mackayi* ♀ × *O. crispum* ♂.

- (3) *Z. Mackayi* ♀ × *O. grande* ♂.

- (4) *Z. Mackayi* ♀ × *O. bicktonense* ♂.

"A few seedlings of *each* cross" were raised by Mr. Seden for Messrs. Veitch & Sons. "All of which flowered pure *Z. Mackayi*." (In litt., September 25, 1897.)

ZYGOPETALUM × ONCIDIUM.

(1a) *Z. Mackayi* ♀ × *O. unguiculatum* ♂. A plant raised in Florence, Italy, by a friend and correspondent of Mr. Eichel, of Bradford, "has flowered pure and simple *Z. Mackayi*."

(1b) Rev. F. D. Horner, of Burton-in-Lonsdale, Kirkby Lonsdale, tells me that he had three seedlings of this same cross, which he grew for four to five years, but they unfortunately died before flowering; "but the plants seemed the fac-simile of *Z. Mackayi* in both bulbs and foliage. . . . All experts who saw them called them *Z. Mackayi* plants." (In litt., September 9, 1897.)

ZYGOPETALUM \times LYCASTE.

(1) *Zygopetalum Mackayi* ♀ \times *Lycaste Skinneri* ♂. "A few seedlings," raised by Mr. Seden for Messrs. Veitch & Sons, "which all flowered pure *Z. Mackayi*." (In litt., September 25, 1897.)

These curious generic crosses are particularly interesting, and are perhaps the strangest in the history of hybridisation. They are analogous to the three curious offspring of *Epidendrum radicans* mentioned above, being similar in some respects, but they are not parallel cases, because in other respects they differ much. In the offspring of *E. radicans* some traces of modification are apparent to the most casual observer, but in these there does not seem to be the faintest or slightest trace of the other parent. In the offspring of *E. radicans* the father parent was the predominant one, and therefore there could be no chance of accidental self-fertilisation or parthenogenesis, whereas in these we are now dealing with it is the mother parent which is all powerful; and it is quite open for the sceptic to suggest that these curious results are due to self-fertilisation, or that they were produced without the aid of pollen. But, on the other hand, it is easy to show that self-fertilisation is out of the question in all these crosses, and that in the *Zygopetalum* crosses, at all events, parthenogenesis is equally out of court.

With regard to self-fertilisation:—(a) Mr. Grey writes that in his *Phragmipedium* \times *Paphiopedium* "the pollen was removed from the seed-bearing plant before the flower was fully expanded." ("Orchid Hybrids," p. 189.) (b) *Zygopetalum* \times *Odontoglossum* and *Lycaste*. Mr. Seden writes: "I am quite sure the pollen was removed from the *Z. Mackayi* in every case." (c) *Zygopetalum* \times *Oncidium*. Mr. Eichel writes: "I have so much confidence . . . that the probabilities of self-fertilisation of the *Zygopetalum* flower is out of the question," and Rev. F. D. Horner writes: "I am confident of one thing, and that is that no pollen of the seed-parent (the *Zygopetalum*) had any part in the production of these seedlings." So that in all these cases it is manifest that self-fertilisation is a broken reed to lean upon for an explanation.

Perhaps I might here point out the difference between these cases and the *Cypripedium* curiosities mentioned before, which I have attributed to accidental self-fertilisation.

These nine cases are all that have been tried between these genera, so far as we know, and all have had the same result, being the rule and not the exception ; whereas the *Cypripedium* cases were but a few curiosities out of hundreds of normal hybrids, and therefore the exception rather than the rule. With regard to the suggestion of parthenogenesis I cannot deny that Mr. Grey's cross between *Phragmipedium* and *Paphiopedium* might possibly be due to this, especially as the plant closely resembled the mother parent variety as well as species, and only differed but slightly in size of flower. Parthenogenesis, or the production of fertile seeds in a pod without the aid of pollen, is well known to occur in certain plants (see Kerner and Oliver, "Natural History Plants," ii. p. 469 ; *Gardeners' Chronicle*, August 23, 1890, p. 218) ; and Prof. Henslow in his "Structure of Flowers," p. 171, refers to an interesting discovery accidentally made by Dr. Treub. Dr. Treub found a larva of an insect in the ovary of a Mauritian Orchid, *Liparis latifolia* : it did not injure either the ovules or the ovary, but seemed to feed on the juices secreted by the ovarian cavity. In this cavity, *without the aid of pollen*, the ovules developed and became covered with seed-coats, as if under the influence of pollination, so that the irritation of the larva determined the development of the ovules in the same way that the pollen tubes would have done.

This possibly may have happened with Mr. Grey's plant. The pollen tubes of *Paph. Stonei* may have irritated and developed the ovules by feeding on the juices of the pod, and in some way failed to fertilise the egg-cell, the result being a seed-bud developed within the pod bearing the characters of the mother species and the mother variety. But it is not fair or proper to generalise from an isolated instance like this ; we must wait patiently for further results before we attempt to assign or determine the real cause of this curiosity.

But in the case of the *Zygopetalum* crosses we can make more sure of our ground. If these were caused by parthenogenesis all the plants would be alike from one pod ; but this was not so, for Mr. Seden writes to me that "all the seedlings varied, the same as all imported plants in size and colour," and we know that one of Mr. Treseder's plants differed in colour from its birth-mates, "the lip being almost wholly white, with a few slight purple marks at base and centre, and the margin was

more wavy in outline" (shown at Royal Horticultural Society, December 15, 1896).

Therefore it is manifest that neither self-fertilisation nor parthenogenesis will hold good in these cases. Nor can they be due to the natural prepotency of *Z. Mackayi* as a parent, for we

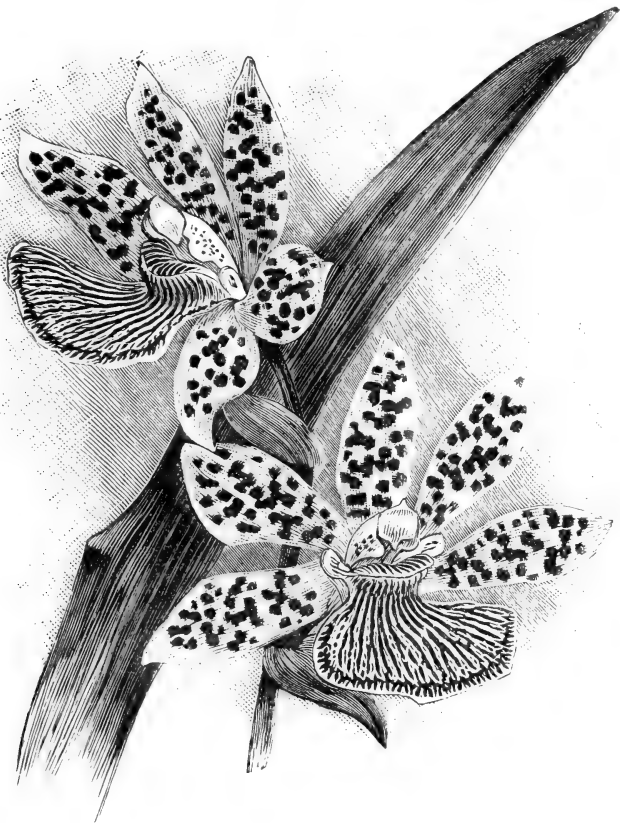


FIG. 110.—*ZYGO-COLAX* × *VEITCHII* (*ZYGOPETALUM CRINITUM* ♀ × *COLAX JUGOSUS* ♂). (*Journal of Horticulture*.)

know of three other hybrids at least, having *Z. Mackayi* as a parent, which are all fairly intermediate in character:—(1) *Z. × Sedenii* (*Z. maxillare* ♀ × *Z. Mackayi* ♂), Veitch, *Gardeners' Chronicle*, 1874, p. 290. (2) *Z. × leucochilum* (*Z. Mackayi* intermedium ♀ × *Z. Burkei* ♂), *Orchid Review*, iv. p. 62.

(3) *Z. × Perrenoudi* (*Z. Mackayi* intermedium ♀ × *Z. Gauthieri* ♂), *Dict. Icon. Orch.* Zygo. hyb. pl. 1.

Nor can it be said that *Zygopetalum* as a genus is prepotent over other genera, for twice it has been crossed with *Colax*, and in both cases true hybrids, intermediate in character, have been raised.—(1) *Zygo-Colax × Veitchii*, Rolfe in *Linn. Soc. Jour.* xxiv. p. 170. (Fig. 110.) (*Z. crinitum* ♀ × *C. jugosus*.) (2) *Zygo-Colax × leopardinus* (*Z. maxillare* ♀ × *C. jugosus* ♂), Reich. *Gardeners' Chronicle*, 1886, i. p. 199.

So that, as far as our present knowledge goes, we can only account for the prepotency of *Zygopetalum* over *Odontoglossum*, *Oncidium*, and *Lycaste* in the same way that we have had to explain the predominance of *Epidendrum* over *Cattleya*, *Lælia*, and *Sophranitis*, namely, that in the germ-cells of *Odontoglossum*, *Oncidium*, and *Lycaste* there must be a certain proportion—a large proportion in these cases—of unmodified nuclear particles of *Zygopetalum*, and that, therefore, *Zygopetalum* is the common ancestor of *Odontoglossum*, *Oncidium*, and *Lycaste*, and that the three latter genera are more recent in their origin than the ancestral genus *Zygopetalum*. A somewhat interesting confirmation of this in regard to *Odontoglossum*, at any rate, is the fact that the seedling *Odontoglossums* raised by M. Leroy for Baron Rothschild, of Paris, “during the first eighteen months of their growth resembled *Zygopetalum* more than they did *Odontoglossum*.” (“*Orchid Hybrids*,” p. 226.) Students of embryology will appreciate this fact, for it is well known to them that all living beings tend to resemble their ancestors in the early stages of their development.

CURIOUS CROSSES.

In the *Orchid Review* for June 1897 I recorded a few curious generic crosses made by me during the early part of this year, with the results up to June 1. I venture to repeat them here with their progress up to date.

(1) *Lycaste Skinneri* ♀ × *Lælia anceps Sanderiana* ♂. Crossed February 15, 1897. A healthy-looking pod 5 inches in girth.

(2) *Lycaste Skinneri* ♀ × *Brassavola glauca* ♂. Crossed February 15, 1897. A good-looking pod 5 inches in girth.

(3) *Cypripedium Calceolus* ♀ × *Phragmipedium* × *Sedenii candidulum* ♂. Crossed March 18, 1897. Pod ripened August 15, 1897; 166 healthy seeds. (*Orch. Rev.* v. p. 365.)

(4) *Paphiopedium Exul* ♀ × *Cypripedium Calceolus* ♂. Crossed April 16, 1897. (Since ripened 597 good seeds. *Orch. Rev.* v. p. 365.)

(5) *Angræcum sesquipedale* ♀ × *Lælia purpurata* ♂. Crossed May 9, 1897. Fine pod $4\frac{1}{2}$ inches in girth, opened July 31, 1897, eighty-three days after pollination; no seeds, ovules shrivelled. Interior of the pod full of fluffy, silky, downy threads or fibres, loosely woven together.

(6) *Cattleya Mossiæ* ♀ × *Angræcum sesquipedale* ♂. Crossed May 9, 1897. Pod swelled to $2\frac{1}{8}$ inches girth; withered away, July 1, 1897. Pollen tubes had grown $2\frac{1}{2}$ inches down the column, and had reached the ovary; ovules undeveloped.

Since then I have set two pods of *Oncidium incurvum* ♀ × *Odontoglossum crispum* ♂, swelling rapidly. Crossed August 11, 1897.

A summary of my notes was republished in M. Cogniaux's *Dictionnaire Iconographique des Orchidées (Chronique Orchidéenne)*, June 1897, and in the following number M. Georges Mantin, of Château de Belair, Olivet, Orleans, France, was good enough to give his opinion on these generic crosses, comparing them with others made by himself on similar lines, such as *Paphiopedium* × *Phragmipedium*, *Cypripedium* × *Paphiopedium*, *Cypripedium* × *Phragmipedium*, *Oncidium Papilio* crossed with self and with other *Oncidiums*, *Lockhartia* × self, and with *Oncidiums*, &c. M. Mantin obtained pods and even seeds from these crosses, but had never been able to raise any plants. ("J'ai observé parfois des grossissements prolongés de l'ovaire. J'ai même obtenu des graines de ces croisements plus ou moins rationnels, mais il n'est jamais rien levé de ces semis.") M. Mantin also mentioned that he had sown seeds of more than forty pods of *Paphiopedium* (*Cypripedium*) *barbatum* and allied species crossed with *Cypripedium Calceolus*, but none ever grew. ("J'ai servi plus de 40 (je dis *quarante*) gousses à graines de *C. barbatum* et espèces voisines fécondées par *C. Calceolus*. Je n'ai jamais constaté qu'une seule graine ait germé.") Further, M. Mantin expresses the opinion that in the above curious crosses I shall reap the wind instead of seeds, and will be very

lucky if I do not reap the whirlwind also in the death of my plants by submitting them to such a parentage. I must say that I am a little more hopeful in this matter than M. Mantin appears to be, though I stated at the time that "it yet remains to be seen whether these healthy-looking pods will produce good seed." (*Orch. Rev.* v. p. 180.)

True, in one case I have already "reaped the wind," but in another I have reaped *good seeds*, and one success is worth many failures, so that I am looking forward to the future with increased interest. With regard to the health of the plants bearing these seed-pods, I do not find that they have suffered more than is usual with seed-bearing plants, and I hope that the "whirlwind" may be yet a great way off.

Still, I do not think it wise to lay too much stress on the production of pods in these curious generic crosses, for pods are often formed apart from fertilisation or pollination. Darwin in his "Animals and Plants," i. p. 434, gives a remarkable instance of this. "Mr. Smith, late Curator at Kew, observed the singular fact that the development of the ovarium could be effected in the South African Orchid, *Bonatea speciosa*, by the mechanical irritation of the stigma *without any pollen*." The Secretary of the Orchid Committee, Mr. Jas. O'Brien, has had a similar experience with *Lycaste Skinneri* and *Odontoglossum crispum*. (In. litt., September 25, 1897.) By placing small pieces of grit on the stigmas of these, he found that the ovaries in many cases swelled, and the pods attained maturity just as though the flowers had been properly fertilised; but of course with no vitality in the grains within. We have already seen how Dr. Hildebrandt and Mr. Harry Veitch independently observed that the development of the pod in the ordinary pollination of *Dendrobium* and *Cattleya* takes place long before the pollen tubes have reached the ovules. We also know from experiments that pollen grains will push out pollen tubes in an artificial sugar solution, altogether apart from the stigma; and, further, that pollen grains placed in gelatine at some distance from isolated ovules in the same medium send out their tubes and at once make for the ovules. This has been observed in the case of widely different plants. Thus the pollen tubes of a Monocotyledon have been attracted by ovules of Dicotyledons, and in some cases have actually penetrated the micropyle itself; but, of course, fertilisa-



FIG. 111.—BRASSAVOLA DIGBYANA (LINDL.). (*Gardeners' Chronicle.*)



tion has not taken place. (Kerner and Oliver, "Nat. Hist. Plants," ii. p. 415.) In my own observations in crossing distinct genera of Orchids, *Cattleya* × *Angræcum*, *Dendrobium* × *Epidendrum*, *Dendrobium* × *Cattleya*, *Dendrobium* × *Odontoglossum*, *Epidendrum* × *Odontoglossum*, in many cases the pollen tubes grew, and the pods swelled slightly, but fertilisation did not take place.

In fully formed pods that have opened prematurely, and have been found to be empty, nearly all have had bundles of pollen tubes lying alongside the undeveloped ovules, sometimes extending to the bottom of the pod, but with no traces of fertilisation.

Thus we see that the swelling of the pod and the growth of the pollen tubes may be in a sense mechanical rather than physiological, and therefore we should not attach too much importance to the fact that the pod has developed to its normal size after the application of foreign pollen. We should wait until proper fertilisation has taken place and good seeds are produced before venturing to think of success. Even then, if the seeds germinate by proper treatment, and plants are raised, they may refuse to flower, as in many *Paphiopedium* × *Phragmipedium* crosses hitherto; and if they flower they may not turn out to be true hybrids as in the *Zygopetalum* crosses mentioned above. "There's many a slip betwixt the cup and the lip." Nevertheless, whether we succeed or whether we fail, all these experiments and observations are interesting, and add to our knowledge of plant life.

FERTILITY AND STERILITY OF HYBRIDS.

Before Darwin published his "Origin of Species" it was generally held by naturalists that distinct species were seldom fertile with one another, and that if hybrids were raised at all they were quite sterile and barren; and very often the whole question was begged by classing those species that did cross as varieties of one. Darwin made a most careful and elaborate study of the whole question of hybridism, and came to the following conclusions:—"First crosses between forms sufficiently distinct to be ranked as species, and their hybrids are very generally, but not universally, sterile. . . . The sterility is of

all degrees." ("Origin of Species," 6th ed., p. 262.) Again : "The sterility of distinct species when first united, and that of their hybrid offspring, graduates by an almost infinite number of steps from zero (when the ovule is never impregnated and a seed capsule is never formed) up to *complete fertility*. . . . This high degree of fertility is, however, rare." ("Animals and Plants," 2nd ed., vol. ii. p. 163.)

Fifteen years later we find Dr. Alfred Wallace enunciating similar views. He writes : "One of the greatest, or perhaps we may say the greatest, of all the difficulties in the way of accepting the theory of natural selection as a complete explanation of the origin of species has been the remarkable difference between varieties and species in respect of fertility when crossed. Generally speaking, it may be said that the varieties of any one species, however different they may be in external appearance, are perfectly fertile when crossed, and their mongrel offspring are equally fertile when bred among themselves ; while *distinct species*, on the other hand, however closely they may resemble each other externally, are *usually infertile* when crossed, and their *hybrid offspring absolutely sterile*." ("Darwinism," 1890, p. 152.) Dr. Wallace wrote these words some seven years ago, but since that time some hundreds of hybrid Orchids raised by hand from distinct species have flowered in gardens.

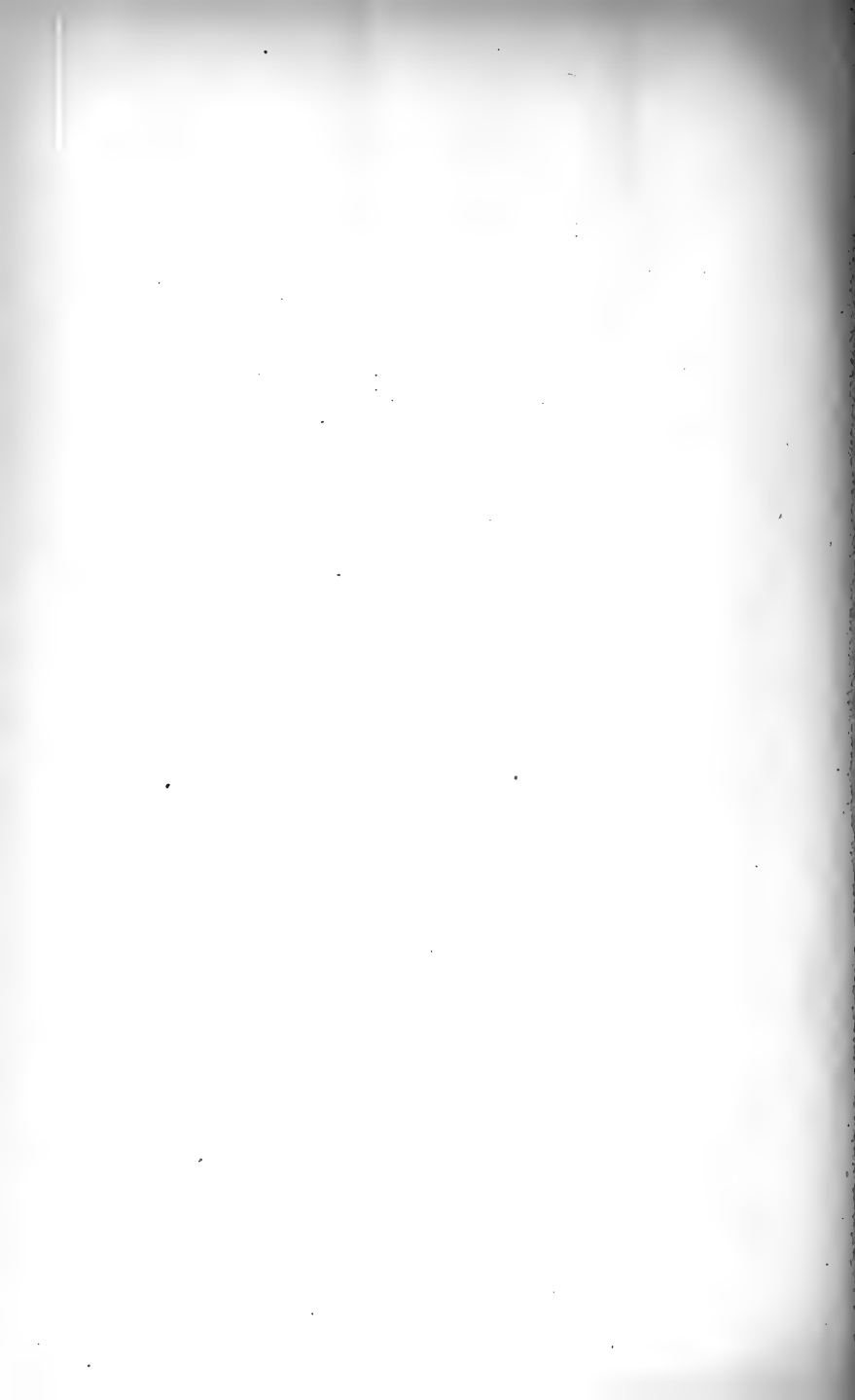
In consulting that admirable work of reference, the "Orchid Hybrids," by Mr. George Hansen, of California, with the second supplement made up to April 1, 1897, I find that there are on record 733 hybrids from *distinct crosses* which have already flowered, and of these 485 are the offspring of species \times species, and the remainder, 248 in number, are all the offspring of hybrids.

As far as the great Orchid Order is concerned, therefore, we can hardly say now that "distinct species . . . are usually infertile when crossed," and still less can we say that "their hybrid offspring are absolutely sterile."

Darwin laid much stress on the different degrees of sterility, almost as much as on absolute sterility. In Orchids we have not yet sufficient evidence to show that crosses between distinct species produce fewer offspring than crosses between varieties of the same species ; or, on the contrary, that they are equally



FIG. 112 —BRASSO-CATTLEYA × DIGBYANO-TRIANÆ (CATTLEYA TRIANÆ ♀ × BRASSAVOLA DIGBYANA ♂). (*Gardeners' Chronicle*.)



fertile, very few of the latter crosses having been attempted; and as it is with species so it is with hybrids.

In the meantime perhaps the following figures will give us an idea as to the relative fertility of species and hybrids in the *Cypripedium* group. These figures are taken from the records kindly placed at my disposal by Mr. Reginald Young, of Sefton Park, Liverpool, and have been carefully copied by him from his stud-book with his well-known care and precision.

Taking the *Paphiopediums*, or East Indian *Cypripediums*, which broadly represent the tropical species of this group in the Old World (see Mr. Rolfe, in *Orchid Review*, iv. p. 363), I find that Mr. Young has made 577 crosses among thirty distinct species, and fifty-three distinct hybrids during the past five years, crossing species with species, species with hybrids, hybrids with species, and hybrids with hybrids, and all under uniform conditions. Out of these 577 crosses Mr. Young succeeded in getting 452 pods of good seed, which represents 78·3 per cent. fertile. An analysis of these figures shows that out of 188 crosses between distinct species 179 pods of good seed were obtained; a degree of success difficult to excel even in crosses between varieties of the same species, representing as it does 95·2 per cent. fertile. While out of 389 crosses in which a hybrid was concerned in the parentage 273 pods of good seed were obtained, being 71·8 per cent. fertile, showing a decrease of fertility of 23·4 per cent. in crosses between hybrids as compared with crosses between species. This seems to point to the conclusion that in this *Cypripedium* group while crosses between distinct species are almost, if not quite, as fertile as crosses between varieties of the same species, yet crosses with hybrids, though fertile to a very large extent, are yet slightly less fertile than crosses between species. What is the cause of this slight decline in the fertility of hybrids? From Mr. Young's experiments it seems to be due in a large measure to the loss of power in the male element of the hybrid. For out of 143 hybrids crossed with the pollen of pure species 128 fertile pods were obtained, or 89·5 per cent., showing a very slight loss of power in the female element of the hybrids of 5·7 per cent. While out of 118 pure species crossed with the pollen of hybrids only sixty-seven pods of good seed were obtained, showing 56·7 per cent. fertile. This represents a loss of power in the male element of the

hybrids of 38·5 per cent., compared with that of species crossed with species. Why the male element should be affected more than the female element in hybrids is not at all clear; and whether in time by constant crossing this would gradually be eliminated I cannot say; but I observe that while species crossed with pollen of hybrids produce as we have seen 56·7 per cent. fertile pods, yet 124 hybrids crossed with pollen of hybrids produced seventy-four good pods, or 59·6 per cent., being an increase of fertility of 2·9 per cent. This may possibly be due to the fact that the hybrids crossed with hybrids were of necessity more nearly related to one another than species crossed with hybrids, and it is highly probable that by constant mixing hybrids may regain the higher fertility usual among species and varieties.

With regard to the lessened fertility of hybrids used as the father compared with the greater fertility of hybrids used as the mother, and its probable effect on the intercrossing of species in a state of nature, is not for me to deal with now; but it is of great importance to the evolutionist as a possible factor in the origin of species. All these experiments and observations prove to us how important it is for Orchid breeders to keep accurate and precise records of the crosses they make from time to time, the details of which may prove to be of inestimable value to science.

THE DEPTH IN THE SOIL AT WHICH PLANTS OCCUR.

By Prof. F. W. OLIVER.

[Read November 9, 1897.]

MANY plants, especially such as are perpetuated by subterranean rhizomes, tubers, bulbs, and the like, are characterised by the particular depth in the soil at which these structures usually occur. Thus the rhizomes of *Aspidistra elatior* creep at the surface, those of Solomon's Seal at some little depth, whilst those of *Asparagus* may be as remote from the surface as 10 to 16 inches. Now in cases in which the structure is normally buried at a certain depth this is not attained all at once by the seedling, but gradually, and often only after the lapse of several years. The seed germinates at or near the surface, and during

the process the representative of the future plant (*i.e.* the plumule and radicle) may be carried some little distance down, at any rate a few millimetres into the ground. Not too far, however, for with the limited resources at its disposal grave difficulties might arise in bringing the first leaves up to the light. This is often the case when the cotyledon or cotyledons are hypogeal, and is particularly notable amongst the Monocotyledons, in which the apical part of the cotyledon generally remains as a sucker within the seed, whilst its basal sheathing portion emerges, and stretching pushes the radicle and plumule some little distance into the soil. From this position the first leaves are unfolded, and various means are employed in different cases to bring the young plant to a deeper level. It is with these methods that the present paper is concerned.

1. ROOT-SHORTENING.

Not the sole, but by far the most important agent in this process is the contractility of the root. As this particular property of roots is a little overlooked in the usual sources of information, it will be convenient to indicate the main features of the phenomenon.

A shortening or contraction of the root on the attainment of a certain age is of frequent occurrence, and in well-marked cases is associated with a transverse wrinkling, which is quite unmistakable. This commences in the oldest part of a root, some time after growth in length has ceased in the region concerned, and spreads in the direction of the apex. This is well shown in fig. 113, representing the root of *Carum Carvi*, as also in fig. 114, representing successive stages in the life-history of the Amaryllidaceous *Phædranassa chloracea*. The general phenomenon of root-shortening has been the subject of investigations by de Vries,* Stroever,† and Rimbach,‡ and the main facts in the operation may be briefly summarised as follows:—

Many roots exhibit in those parts which have ceased to grow in length a definite and measurable contraction, owing to a remarkable change in form in the cortical cells. These still

* De Vries, *Landw. Jahrb.* 1880.

† V. Stroever, *Ueb. d. Verbreitung d. Wurzelverkürzung*, Inaug. Diss. Jena, 1892.

‡ A. Rimbach, numerous papers in *Ber. d. deutsch. bot. Ges.* vols. xi. to xv.; also Fünfstück's *Beitr. zur Wissensch. Bot.* Band ii. p. 1.

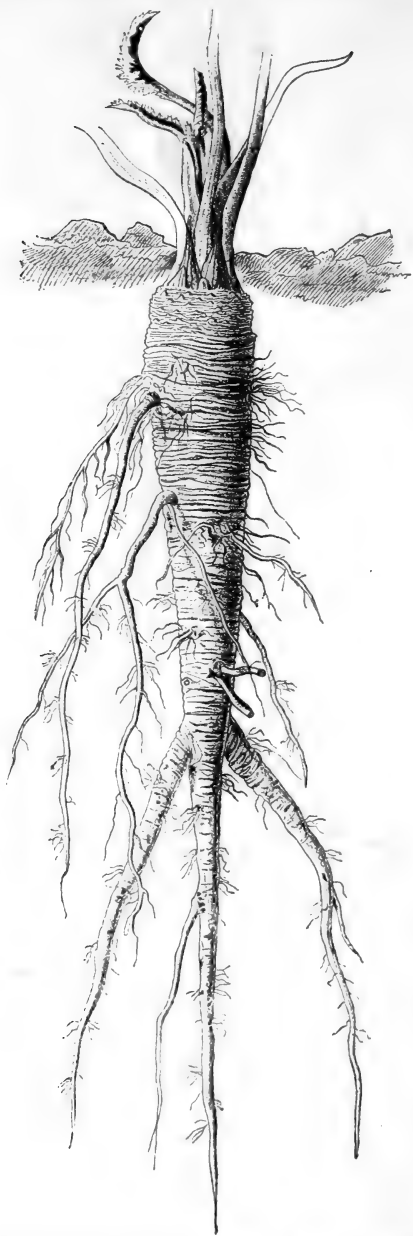


FIG. 113.— ONE-YEAR-OLD ROOT OF "CARUM CALVI," SHOWING TRANSVERSE WRINKLING. (After Stroever.)

active, living cells undergo a shortening in the longitudinal direction combined with a marked radial extension. At the same time—and this is an essential factor—there is an absorption of water by these cortical cells whose shortening in the one direction is more than compensated by expansion in the other. The root, therefore, though becoming shorter, may in the aggregate be bulkier than it was before, unless it happens, as sometimes is the case, that a certain number of layers of cells in the outer cortex become flattened and obliterated. The effect of the shortening cortex is a very definite one upon the other parts of the root. The central cylinder of the root, in which are located the vascular strands, is forcibly compressed, and in cases in which it is resistant it may assume a sinuous course. The periphery of the root, *i.e.* the piliferous layer, and the immediately subjacent layers of the cortex being by this time dead, and their walls in part suberised, cannot participate in the general contraction. It is this portion which, as a consequence is thrown into transverse ridges and furrows, giving the characteristic appearance of contracted roots.

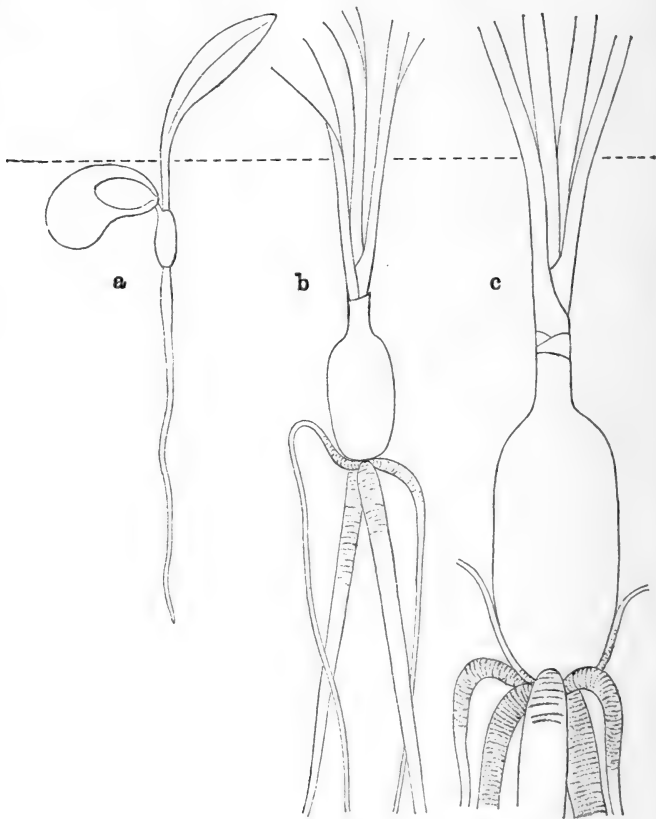
In addition to these the principal phenomena of root-shortening, a transverse striation of microscopic dimensions is met with in the endodermis and in the layer of cortex immediately beneath the piliferous layer. This striation is the expression of minute foldings of the suberised walls peculiar to these layers, and according to Rimbach arises only in roots which have entered on the contractile phase.

The amount of actual shortening is very different in different plants. It may be only 5 to 10 per cent. of the total length involved, or in other cases may attain to 30 or 40 per cent., or even more.

The special feature associated with root-contraction, with which we have more particular concern here, is the manner in which it leads to the drawing of the whole plant down into the soil. As a root develops it continually penetrates deeper into the soil and comes into intimate contact by means of its root-hairs with the particles of the soil, and as the apical development continues it becomes in time very firmly fixed. When, now, contraction supervenes in the older parts, tensions arise which lead, in the case of roots normally fixed, to a gradual pulling down of the whole plant into the soil. So considerable is this tension that if the root be cut, a space 2 or 3 milli-

metres across may arise between the two cut surfaces. Three stages in the sinking of a young plant of *Phædranassa chloracea* into the soil from this cause are illustrated in fig. 114.

The contractility of roots is effective in this way not only



G. 114.—THREE STAGES IN THE ESTABLISHMENT OF YOUNG PLANT OF 'PHÆDRANASSA CHLORACEA' IN THE SOIL: (a) Seedling with cotyledon in seed and one leaf raised above the surface. (b) Six-month-old plant with four contractile roots, two of which, now arched, are no longer effective. (c) Year-old plant sunk still deeper. The dotted line represents the surface. (After Rimbach.)

with vertically placed stem-structures, but also in many cases of horizontal rhizomes, runners, and the like (e.g. *Arum maculatum*, *Iris germanica*, *Fragaria vesca*), though of course in many

of these the effect is relatively small; whilst in the Bramble adventitious roots arise from the pendent tips of straggling branches resting on the ground and draw them under the surface of the soil. Next season the tip grows up again into the light, and on the decay of the connecting branch we have an independent rooted plant.

Though a certain degree of contractility appears to be a widely spread property in roots, it must not be regarded as a universal one. Many plants possessing demonstrably contractile roots have others in which the property is lacking. In other cases all roots are contractile, whilst in many instances (e.g. *Colchicum autumnale*, *Tulipa gesneriana*, *Zea Mays*, and other grasses, &c.) none of the roots of the plant show any trace of contractility. Not infrequently the contractile roots are more or less fleshy (*cf.* figs. 113 and 114), and often are of a characteristic spindle-shaped figure. Such roots, particularly amongst Monocotyledons, owe their fleshiness to a large development of cortex—of the tissue, that is, in which the contractility especially resides. And it is amongst these fleshy roots that the phenomenon is best exhibited, though even amongst these contractility is not always present, for Rimbach was unable to demonstrate its presence in terrestrial Orchids (e.g. *Orchis maculata*, *Listera ovata*). In any case such roots play an important part as reservoirs of reserve materials, and in some cases the plant depends entirely upon them for storage during the dormant season. That the functions of storage and contractility should be so often concentrated in the same structure is readily intelligible. For the bulky roots adequate for the first of these functions are, owing to the powerfully developed cortex, most effective in the carrying out of the second.

It will now be convenient to illustrate the foregoing more general remarks by reference to special cases, and for this purpose the life-histories of a limited number of types may be epitomised.

(1) All roots contractile, the primary root not persisting.

Amongst *Monocotyledons* the phenomenon has been carefully followed by Rimbach in numerous bulb- and corm-possessing plants belonging to the Liliaceæ and Amaryllidaceæ.

Phædranassa chloracea (fig. 114).—The seed germinates at the surface, and forthwith the plumule and radicle are not only pushed out, clear of the seed, by the elongation of the sheathing

base of the cotyledon (fig. 114, *a*), but to a point a few millimetres beyond and below the seed. In slight degree, therefore, the cotyledon co-operates in the sinking of the young plant into the soil, a common enough phenomenon amongst Monocotyledons. The radicle now elongates, and the plumule unfolds a first green leaf. The root soon enters on the contractile phase, and the stem, ever becoming more bulky, is carried a little further down. Root after root now arises from the base of the stem, and at six months the condition shown in fig. 114, *b*, prevails. The two youngest roots are in the contractile phase and exhibit the usual transverse wrinkles. Two others, including the primary root (on the left), are arched owing to their points of insertion having been depressed by younger roots subsequent to the period of their own contraction. In fig. 114, *c*, the year-old plant is shown. The bulb is already bulky and deeply sunk in the ground owing to the continuous production of fresh contractile roots from the base of the stem.

The depth at which adult plants usually occur is from 15 to 30 centimetres, and Rimbach has shown that when this depth is attained the roots then formed are less markedly contractile than during the earlier stages. If, however, a fully grown bulb be placed near to the surface, the fact is recognised by the plant, and strong, contractile roots are again produced. The precise nature of this remarkable form of irritability is obscure and probably complex. It is not proposed to discuss the question here. Let it suffice to say that numerous experiments carried out by Rimbach on this plant have established the fact that at all stages of development a bulb of *Phædranassa chloracea* is capable of producing either highly or only slightly contractile roots, and that the sort formed at any given time is determined by the depth in the soil at which the bulb rests.

The type of *Phædranassa*, in which all the roots are contractile, is widely prevalent in the orders Liliaceæ and Amaryllidaceæ. *Lilium Martagon*, *Allium ursinum*, *Scilla bifolia*, and *Leucojum vernum* may be quoted as examples.

From amongst Dicotyledons *Fragaria vesca* and *Hieracium Pilosella* may be named as examples of the above type.

(2) Roots not all contractile. As in type (1) the primary root does not persist.

Arum maculatum.—Starting as in the last type with the

germination of the seed, we find that the plumule and radicle are here, as before, pushed out of the seed by the elongation of the cotyledonary sheath (fig. 115, *a*). In this way the bud is sunk some two centimetres in the ground. The axial portion of the bud undergoes a slight thickening, and the cotyledon and primary root die away, leaving a little tuber, which remains

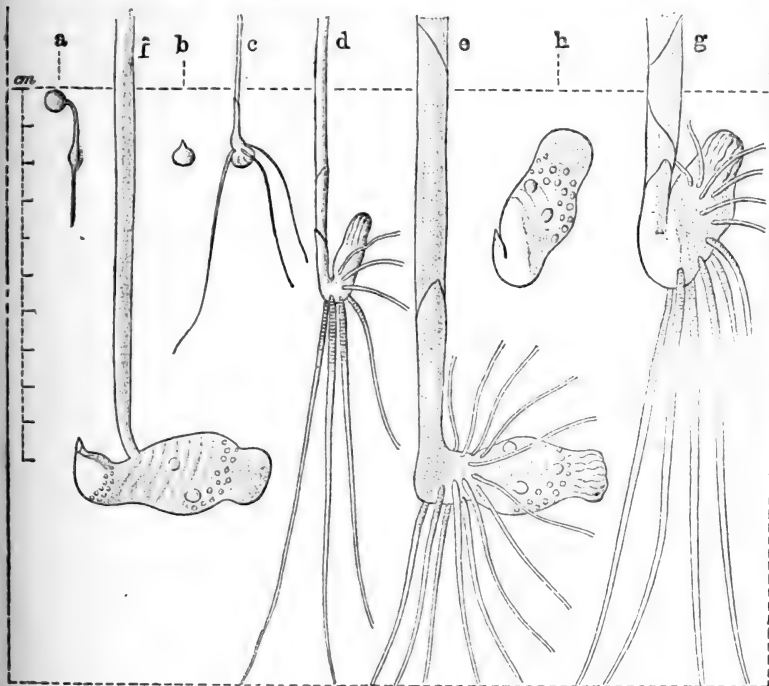


FIG. 115.—‘*ARUM MACULATUM*’: (*a*) Germination. (*b*) Resting stage of tuber after germination. (*c*) Young plant in the spring of the second year. (*d*) Young plant descending. (*e*) Full-grown plant at its normal depth (spring). (*f*) Similar plant in August. (*g*) Full-grown plant, placed near the surface, descending (April). (*h*) The same plant during the resting period in August.

dormant till the autumn (fig. 115, *b*). At present the apex of this tuber is directed upwards. In the autumn a circle of roots arises just beneath the apex, and these roots are, some one or two or them, contractile, the rest non-contractile. The result of the shortening of the former is that the apex of the tuber is drawn to one side, thus occupying a slightly lateral position

Next spring a green leaf is unfolded from the bud and expands above the surface (fig. 115, *c*). In the autumn of the same year more roots arise, distributed about the apex in the same manner, those on the under side being contractile. The apex is thus continually depressed (fig. 115, *d*), and from year to year the tuber gradually approaches its normal depth of 10 centimetres. When this is attained, as shown in fig. 115, *e*, the new roots are no longer appreciably contractile, and the tuber extends itself in the horizontal direction (fig. 115, *f*). If raised and placed near the surface the roots formed are contractile, and the sinking process is again exhibited. (*Cf.* fig. 115, *g* and *h*.) As a rule, in *Arum* new effectively contractile roots arise on the tuber in the late autumn. With winter comes a dormant period; whilst next spring leaves are unfolded and the roots perform the usual nutritive function. On the ripening of the fruit (August) the leaves and roots are lost and another passive phase entered on (fig. 115, *f* and *h*). Finally in the late autumn new roots are developed.

The above example, in which some, at any rate, of the roots produced at any given time are non-contractile, leads on to the more usual condition in which only a very limited number of all the roots formed have the power of shortening. This condition is well illustrated by the *Crocus*. From the base of the old corm thin nutritive roots arise, and in early spring foliage and flowers expand from the buds. As time goes on the base of each bud enlarges and forms next year's corm. During the development of these young corms it is a common occurrence for each to give origin to a solitary spindle-shaped root of considerable succulence and possessed of undoubted contractility. These roots arise at the base of the young corms in early spring, and grow past, or occasionally through, the old corm. They have been occasionally noted in the literature; thus Maw, in his "Monograph of the Genus *Crocus*," alludes to these structures as being of only occasional occurrence upon established plants, though constant in the seedling. He terms them "ephemeral roots," owing to the fact of their subsequent absorption. Though a storage function has been attributed to them, there can be no doubt of their marked contractile properties, as a result of which the young corms producing them are brought down to the level in the soil occupied by the old and exhausted ones.

Maw's reference to this subject (*l.c.* p. 18) is of interest in

this connection. He says:—"The seed under natural conditions germinates near the surface of the ground; but the fully matured corm is rarely found at a less depth than 3 in., and often occurs 4 or 5 in. deep. The small one-year-old corm is always found near the surface, and it is evident that in the annual process of reproduction it possesses some power of descending deeper into the ground. This would, however, seem inconsistent with the mode of reproduction, in which the seed corm is found on the top of that which it replaces." He then describes an experiment in which *Crocus* seeds were sown (in August 1878) half an inch below the surface of the soil in a flower-pot 5 in. deep. On investigating matters in September 1884 the corms were found at the bottom of the pot, and above each a string of empty corm-tunics representing the downward progress of the corms. He concludes:—"The process of the descent of the corm from near the surface to the necessary depth is difficult of explanation, and it must be viewed as one of the many self-protective phenomena in plant-life, the *modus operandi* of which we do not understand."

It is my impression that these "ephemeral" or contractile roots are of much commoner occurrence on *Crocus* corms than Maw suspected. This opinion is based on the fact that I have never for many years had any difficulty in procuring ample material of these roots for class demonstration, whilst on at least one occasion the difficulty was to obtain developing corms from which they were absent. Nevertheless, the conditions of their variable and perplexing occurrence have yet to be determined. I am inclined to think them especially frequent (in *C. aureus* and *minimus*) in the case (1) of weakly non-flowering corms, and (2) of corms which have from any cause reached a level too near the surface. This view is advanced with all reserve, as the examples that have come under my own observation are too few to justify any general conclusions as yet.

Other examples of the type in which only a limited number of the roots formed is contractile include *Tigridia pavonia*, *Gladiolus communis*, and several other Iridaceæ. From amongst the Dicotyledons, *Oxalis elegans* behaves in conformity with the above.

(3) A *third type*, common amongst dicotyledonous plants, may be described. In this the primary tap-root persists, and it

and its ramifications undergo a marked shortening. The contractility spreads sometimes to the hypocotyl, which becomes marked by transverse furrows. This type is illustrated by many Umbelliferae; e.g. *Carum Carvi* (fig. 113), *Compositæ*, *Atropa Belladonna*, *Gentiana lutea*, and other herbs with succulent roots. With this contractility is probably associated the disappearance under the soil at the approach of winter of the persistent parts of the stem of many perennials, as well as certain other peculiarities of this class of vegetation.*

In the above cases the level occupied by the plant is materially influenced by the behaviour of the roots; there remains a large

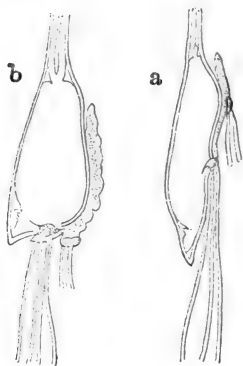


FIG. 116.—‘*COLCHICUM AUTUMNALE*’: (a) Young descending corm from near the surface. (b) Young stationary corm from the normal depth. (After Rimbach.)

number of instances in which the roots do not appear to shorten, but rather definite curvatures of the stem bring the plant to a given level.

II.—SPECIAL CURVATURES OF THE STEM.

This class is well illustrated by *Colchicum autumnale*, which has been the subject of detailed investigation by Rimbach. The normal depth of the corm of this plant is about 15 centimetres; but this is only attained by a seedling after the lapse of a long series of years. The seed germinates at or near the surface in the usual way, and the young stem soon thickening forms the primary corm. Each year a new corm arises from that of the

* Cf. Kerner, *Natural History of Plants*, English edition, vol. i. p. 768.

previous season. As is well known, the growing apex of the corm is situated laterally at its base (*cf.* fig. 116), and it is there that the new corm is produced. In the case of a *Colchicum* plant growing at its normal depth in the soil, the new corm arises as an outgrowth at the base on the same level as the old corm (fig. 116, *b*). But when the corm has not yet reached the normal level, as after germination, or if a full-grown corm be raised and planted at an insufficient depth, the portion of stem from which the new corm develops does not project horizontally, but bends downwards (fig. 116, *a*), so that the new corm is formed about half a centimetre below the level of the old one. This process being continued from year to year, the corm is ultimately formed at a certain average depth, which is maintained. So far as the roots are concerned, it does not appear that they have any influence in this sinking of the plant.

Other cases in which the stem initiates the change in level are *Paris quadrifolia*, *Dentaria bulbifera*, *Adoxa*, *Circæa*, &c. The exact nature of this response on the part of the stem is an obscure matter demanding further investigation.

Amongst these curving stem structures we may also include the "droppers" of Tulips. These are particularly well marked, and of very constant appearance in *Tulipa sylvestris*. A "dropper" is a stolon-like structure arising within the old bulb, which pushes through the bulb-scales, and contains at its free extremity a little bulb which sprouts in the usual way at a varying distance from the parent bulb. Not infrequently this stolon grows downwards from the old bulb, and the new bulb is thus produced some little distance below. So far as my own observations extend, these droppers appear to behave as would be expected; *i.e.* when the bulbs are planted near the surface the droppers descend; when very deep and below the normal level of *Tulipa sylvestris* in the soil they curve upwards. For convenience I have termed these droppers "stolon-like." In point of fact, they have a peculiar morphology, and are not simply axial structures.

III.—ELONGATION OF A FOLIAR MEMBER.

The sinking of the plant is aided by the stretching of the cotyledons in numerous instances. As has been indicated above, this is usually the case when the cotyledon or cotyledons remain

within the seed-coat. This occurs, however, only at germination, and as a rule the amount of stretching is inconsiderable. The co-operation of a leaf in sinking the plant at a later stage of development has only been observed in *Oxalis rubella* and in perhaps one or two other species of this genus. The phenomenon, as described by Hildebrand,* is of so remarkable a nature that we include a brief description of it here.

The seed of *Oxalis rubella* germinates normally enough. Two cotyledons are raised up on a long hypocotyl, whilst the tap-root at its junction with the hypocotyl undergoes local enlargement into a spindle-shaped body. By further growth at the base of the cotyledons a sheath common to them both is formed. From the epicotyledonary bud a single leaf arises, the base of whose petiole swells up, so that it fits tightly the cotyledonary sheath. That portion of the petiole immediately in contact with the small epicotyledonary bud and below the swelling now begins to elongate, and, as the petiole is tightly jammed in the cotyledonary sheath above, the result is that the proximal end of the petiole, together with the epicotyledonary bud, are forced into the substance of the hypocotyl. The interior of the hypocotyl being soft is readily compressed, and the epicotyledonary bud is pushed down through the whole length of the hypocotyl till it reaches the spindle-like enlargement of the root. The petiole then ceases further elongation, and the bud, conveniently placed within the enlargement of the root, grows into a bulb-like structure, which subsequently expands. The means employed in the descent in this plant are remarkable and unique.

In the foregoing pages I have attempted to bring together the main facts which have been ascertained—largely by Rimbach, Stroever, and de Vries—in connection with the various means employed by plants in reaching their normal level in the soil. Owing to the difficulties attending continuous observations upon the subterranean parts of plants our knowledge is still much at fault, whilst the conditions under which many of the phenomena are exhibited are unknown. It is because the practical horticulturist has such unrivalled opportunities for studying these little known phenomena in numberless instances that I am glad that the facts set forth above should appear in the Royal Horticultural Society's Journal.

* Hildebrand, *Bot. Zeitung*, 1888, p. 193.

HORTICULTURAL EXHIBITIONS AND SCHEDULES. WITH THE PRINCIPLES AND PRACTICE OF JUDGING.

By Mr. JOHN WRIGHT, V.M.H.

[Read November 23, 1897.]

VERY reluctantly from one point of view, but most willingly from another, I accepted the invitation of our Secretary to treat on the subject that has been announced for this afternoon's discourse, "Horticultural Exhibitions and Schedules."

The reluctance arose from the pressure of routine duties, which seem to leave scarcely any moments to spare for extraneous work. As to the willingness, I hope I always have been and always shall be willing, so long as I am able, to impart the smallest modicum of information that may be thought helpful in making smoother the progress of the art we love. The Queen of all Arts it is to me—the oldest of them all, yet ever new, the beneficent art of horticulture.

What has it not done, this ancient and modern art in which we rejoice to labour? What has it not done in various ways to supply the needs, to satisfy the minds, and brighten the homes of people of every rank and class in our garden-loving community? It has done far more than I can say, and much—very much—through the agency of horticultural exhibitions.

I remember once being impressed with a letter written by the late eminent American Ambassador to this country, Mr. Bayard; and as a few lines in that letter are appropriate to our subject, I will cite them: "It is all important for national wealth and development that men and women should not expect to enjoy bread without the salt of industry. Nothing so stimulates industry as a realising sense of competition—open, honest, and above board. An old poetic phrase applied to strife was the *gaudium certaminis*—the fierce joy of combat—and there is a touch of it in the more peaceful rivalries of industrial skill which lead men to admire and respect each other while contesting for supremacy."

This is exactly true of the best managed horticultural shows and the best class of exhibitors.

The diversified and meritorious displays of plants, flowers, fruits, and vegetables, and of cultural skill, which have been provided from year to year, have exerted enormous influence in quickening the zeal, intensifying the love, and bracing the energies of those who have shared in producing them. They thus, as a natural corollary, stimulate to greater effort in quest of still higher achievements.

Our horticultural exhibitions do that and a great deal more. With magnet-like force they attract and hold the minds of visitors, who become entranced with some object or another from which they drag themselves with reluctance, only to be haunted with its charms. In a word, they are "captured." And thus are recruits being constantly enrolled in the noble army of horticulturists. This extension of interest in gardening is ever going on and increasing, as it must increase in proportion to the number of centres from which the wholesome influence emanates—diffusing itself like some mystic perfume—sweetening the lives of those who breathe it in deeply—a new breath of life, indeed, it is to them, and they feel the world a better world than it was before.

Not only in the metropolis of the empire are the meetings in this hall and shows of various kinds in and around the city playing a great part in the conversion of the heathen, who have not yet learned to love their gardens as they ought, but effective auxiliaries are formed in earnest co-workers in the provincial cities and towns of the United Kingdom. And also these centres of "sweetness and light"—flower shows—are spreading into rural villages in various parts of the country. New tastes are being steadily but surely created, and as the "appetite grows with what it feeds upon," the future of horticulture is safe. It contains within its huge horn of plenty enough for all: the rich and the rare for the affluent, the not less wholesome or less beautiful if cheaper fare for the workers; and, depend upon it, it will not be till both men of wealth and men of labour share in due proportion in the good things of Mother Earth that our land can be made the land of Goshen that every true lover of his country wishes it to be.

Let us, then, wish prosperity to horticultural shows of all kinds and sizes and in all places, for if well conducted and successful all are doing good. All, however, it has to be

admitted, are not successful. Some start with a flash, have a brief comet-like career, and collapse; others struggle on in a hand-to-mouth manner because they are not founded on a sound basis, and are not managed on the most prudent lines. Then some which are fairly successful, and continue from year to year, seem to do so more as the result of chance than of forethought and a well-considered plan of operations properly carried out.

The proceedings at and in connection with one show may be all that can be desired in smooth working, the harmony of co-operation among the officials, with the resulting orderliness and punctuality in execution being pleasant to see. In another show confusion may rule supreme: "regulations" be ignored as if they had no existence, "time" regarded as an unconsidered trifle, lateness and litter the prevailing features, while errors abound to try the patience and tax the resources of the judges in their efforts at rectification.

What are the chief desiderata of horticultural exhibitions, and what are the main obstacles in preventing their attainment? Surely two primary objects that their promoters ought to keep steadily in view are stability and independence. It is greatly to be feared that too many shows are regarded by a not inconsiderable number of persons, who have voice and vote in their formation and conduct, as institutions for the distribution of prize money. When that is so the element of stability is of necessity lacking, for more than a justifiable amount, having regard to incidental contingencies, is almost certain to be allocated to the prizes. With a majority of exhibitors on committees there is great danger of the cost being underestimated and the estimated income exaggerated.

The chance of success is then entirely dependent in summer on "flower show weather," and largely so, but in a much less degree, in the autumn. It is only by having a majority of clear-headed business men, wholly indifferent to prizes, on the exhibition committee that there is reasonable hope of a society placing itself in a position of independence; and when it finds itself in the happy state of meeting all demands, regardless of the weather, it can practically command all other requisites for insuring success.

A SOUND FOUNDATION.

This brings us to a question that is too often overlooked in

the management of horticultural societies—namely, the establishment of a reserve fund. And lest it should be thought from the foregoing observations that it is assumed that *all* gardeners are averse to this (as they assuredly are not), it is pleasurable to be able to here embody the opinions of one who has won many prizes, and whose connection with a successful show, of which he was for some years the able Secretary, entitles him to be listened to with respect. Mr. G. W. Cummins writes:—

I think, when you are preparing your paper for the R.H.S. on “Exhibitions and Schedules,” it would be a good thing were you to call attention to the necessity for every horticultural society to build up a reserve fund. We all know that many societies have to depend to a great extent on the amount of the money taken at the gate, and a “wet” show day often means ruin to a society which has no fund to fall back upon. I think a reserve fund should at least be equal to the amount of money offered in prizes every year. It must be disheartening to a successful competitor to be told after a show that his or her prize money cannot be paid in full because the funds of the society will not allow it. This has been done, to my knowledge, more than once, and has resulted in some of the best supporters losing confidence and leaving the society. Mr. Sherwood, who is treasurer of the Streatham and Brixton Horticultural Society, in speaking at the annual dinner of that society recently, said how much he desired to see a reserve fund established there, and generously offered to give a handsome donation towards it.

Mr. Sherwood is a gentleman of great business capacity, in full sympathy with all efforts that are made for the expansion of horticulture. His convictions on the subject ought to have much weight, and it is hoped that the society in question will make strenuous efforts to at least double the amount of his donation, whatever it may be, at the earliest possible moment, even if it involve a temporary reduction in prize money. The society will be placed on a more permanent basis, the horticulture of the district continuously advanced, and even exhibitors will be gainers in the end. Obviously what applies to this society applies to others. Still, as no teaching is so cogent as that of experience, an example may be given of a southern provincial show which has been placed on a firm basis, namely, that of the Carshalton district society in Surrey. Mr. A. H. Smee is the Chairman of the committee of this society, and from his long experience as a director of one of the leading insurance companies, no one knows better than he the wisdom of making provision for the future.

The reserve fund which he started with a donation a few years ago has, under prudent management, steadily increased, and now the prize money for a forthcoming show is assured, no matter

however disastrous the weather may prove. Sooner or later the time will come when a portion of the fund may have to be applied to its legitimate purpose. This will demonstrate the value of such a fund, while the work of the society will go steadily on. Financial difficulties are the precursors of conflicting opinions and divided counsels, and these in turn of collapse.

Some years ago great exhibitions were provided in a northern city. With three consecutive shows came torrents of rain, and after the first year or two the funds were exhausted. There was no reserve. Strenuous exertions were made to continue the exhibitions, such as by part payment of prize money. Future obligations were incurred, the fulfilment of which wholly depended on the weather on a particular day specially chosen for a hoped-for retrieval—a fatal day it proved, for show and society were washed away. Last year endeavour was made to recommence horticultural exhibitions in the same populous centre, but, profiting by the experience of the past, active preparations were held in abeyance until a fund was established equal to the discharge of all obligations, without taking into account the payment of visitors to the show—a wise course undoubtedly.

If the active movers in the establishment of horticultural shows were to take more time in preparation for a first event, in order that a substantial sum might be realised, much future anxiety and trouble would be averted. A year lost at the beginning might be a gain of many years in the end, and instead of a struggle with difficulties ending in bankruptcy, a permanent institution would in all probability be the happy alternative. Especially would this be so if the steady accumulation of a reserve fund had a claim on the managers equal to that of providing money for prizes.

We appear, however, to be living in speculative days in which risks are run on the chance that the wheel of fortune may turn in the hoped-for direction; and just because this is so, in connection with many horticultural shows, it is the more incumbent to point out a safer and surer if slower way for achieving permanent success.

The really great shows of the kingdom, such as Shrewsbury, York, and others which could be named, are what they are mainly because of the strength of their financial resources—the

result of sound policy inaugurated and carried out by able commercial men. This has won for them the stability, independence, and prosperity of which they may be justly proud.

A majority of successful business men of accredited position, and with pronounced horticultural sympathies, is an element of strength on a flower show committee which cannot be over-estimated.

I have treated somewhat fully of this subject of making provision for a rainy day, because it is of fundamental importance, and does not commonly receive the attention it deserves in treatises and discussions on horticultural shows.

Passing now to the shows themselves, and matters in connection with them, various points suggest themselves as worthy of consideration ; but prior to their discussion it will be appropriate to refer to the schedules of prizes.

RULES AND REGULATIONS.

A prize schedule, with its rules, regulations, conditions, and definitions, should be regarded as the law governing the particular show to which it applies. It is that or nothing, and being the law the terms employed in the setting forth of the several requirements cannot be too carefully chosen. They must be concise, precise, and so clear as to be very easy to comprehend and very difficult to misunderstand. There must be no breach in any of the enactments either by exhibitors or judges ; and certainly there ought not to be by any of the show authorities, though on one particular point they are far too often the chief delinquents in breaking their own regulations.

If classes are loosely drawn and an exhibitor is prejudiced in consequence, the fault rests, not with the exhibitor or with the judges, but the lawgivers. It is unfortunately true that the terms employed for public guidance are occasionally the reverse of clear. In such cases when products are staged judges may not unreasonably, by a process of induction from the rules and from other classes, endeavour to satisfy themselves as to the intentions of the committee, and do the best they can.

I have often known it necessary to appeal to the authorities of the show on doubtful points, and more than once, with the unsatisfactory result : " Oh, we are not quite sure we leave it

to the judges." In this dilemma, which ought not to occur, and in the absence of evidence of an exhibitor staging otherwise than in the belief that he was within the terms and intentions of the schedule, he should, in accordance with the custom of English judicature, be given the benefit of the doubt and his exhibit admitted. To convict him of doing wrong and rule his products out of competition when he had no precise guidance would be practically fining him for the shortcomings of others for which he could not be in the least responsible.

THE DRAFTING OF SCHEDULES.

Though it is gratifying to observe that much greater care appears to be exercised in the drafting of schedules than was common a few years ago, not all of them are so clear as they should be. Prior to a general summer show in which a gentleman was closely interested he received a schedule which he evidently regarded as somewhat of a puzzle. In substance he described it as excellent, but in form very loose, for the following reasons:—

Under the general heading "Open to All" he found a class "Open to Blankshire," and soliloquised thus: "One's first thought is—Of course it is open to Blankshire if it is open to all. But a second thought arises. Why, it means that *only* Blankshire men may compete, and in that case the class in this 'open to all' section is really '*closed* to all' except exhibitors in one county."

This confusion was caused by the omission of the one word "only." It was inserted in some other classes as "open to nurserymen only" and "open to Blankshire only," and the terms were thus clear; but there were several subsequent classes governed by the large general heading "Open to All" that were said to be simply "open to Blankshire," leading the gentleman to conclude that the words last cited "were redundant and unnecessary, because if 'open to all' obviously the classes are open to Blankshire as part of all, and open to other counties as well."

As a matter of fact it is believed that the several classes, with the assumed "redundant and unnecessary" words attached, were intended not to be open to *any* but Blankshire exhibitors. This might be understood to be so locally; but the point of the

matter is this: An ardent horticulturist was deceived by the terms as they stood, and his strictly correct and logical reading of the schedule led him to a wrong conclusion.

This example of ambiguity suffices as well as many to show how much may hinge on such an apparent trifle as the omission of a small word from the stipulations. As a matter of fact nothing is a trifle that serves a distinctly useful purpose. If it were really necessary to incorporate the local classes with those in the "open to all" division, the addition of a line underneath—"except where otherwise indicated"—would have met the requirements of the case, and then an appendage of "Blankshire only" to certain classes would have made the desire of the committee apparent to all.

Occasionally classes are set forth in terms which cannot be complied with when the exhibits come to be examined. For instance, prizes were recently offered for a specimen Chrysanthemum, any variety, single stem, that carried the largest number and best quality blooms. As a result several plants were placed in competition. Of the three chosen for the prizes one had some 200 so-called blooms, another something over 100, and a third about two dozen. There was not one good bloom on the two larger plants; but a dozen fine specimens on the smallest plant. In the difficulty the judges concluded that the word "and" was accidentally inserted, and that "of" was intended; and as there was the largest number of best quality blooms on the smallest plant, it was accorded the premier position. In the framing of classes it is well, therefore, to keep in mind, not only what is desirable, but what is practicable.

THE AMATEUR PUZZLE.

Among doubts and difficulties that frequently occur in connection with shows are those which arise from what may be known as the perennial "amateur" question. In the schedules and at the exhibitions of the Royal Horticultural Society the established rule is to regard all competitors as "amateurs" who are not nurserymen. This broad distinction meets the requirements of the chief society fairly well, but it is very far from meeting those of the overwhelming majority of local societies.

This is recognised in the excellent code of "Rules for Judging."*

* "Rules for Judging and Suggestions to Schedule Makers, Judges, and Exhibitors." R.H.S. Office, 117 Victoria Street. 1s. 1d. post free.

After the statement that "no person shall be allowed to compete as an amateur who cultivates plants (or other garden produce) for sale," it is recommended that doubts as to the qualification of an exhibitor be referred to the committee of the show for decision. Very good advice it is, but unfortunately many committees find it difficult to decide the point, and disputes appear to go on as briskly as ever among the several persons interested.

What puzzles thousands of ardent lovers of small gardens in which they work so diligently, and who regard themselves as true amateurs (as they are), is that, as they say, such "professionals" as Lord So and So's gardener can show in the same classes as themselves at the exhibitions of the Royal Horticultural Society. They never think, for instance, of his Lordship as the real exhibitor, employing a Mr. Capability Brown to grow garden produce for home use and pleasure, but *not for sale*, and hence the eligibility of the products. But then it may be asked, and is asked, "Is Lord Somebody Else an amateur, and eligible to compete as such through his gardener, who grows produce *for sale* in a *dépôt* in London?" According to the precise rules of the Royal Horticultural Society he is not. His Lordship could compete in an "open" class, and his gardeners in a class for "professional gardeners"; but if he staged in the amateur classes, and a protest were lodged, it would be bound to be sustained, and the exhibitor disqualified.

A fact to be kept in mind in considering this amateur question is that the rich can, and hundreds of them do, love gardening as intensely as the relatively poor, and the comparatively poor can, and happily thousands of them do, love it as ardently as the relatively rich. We must for practical purposes divide them into two intelligible sections—both rendering good service in a common cause, namely—(1) Amateurs as patrons of gardening. (2) Amateurs as the actual workers of their own gardens.

The former may employ as many gardeners as they wish provided they do not grow for sale. They are then well within the meaning of the term "amateur," from the Latin *amator*, a lover of any particular art, but *not profiting by it*. The definition of the second and larger section, for the purpose of exhibiting, varies somewhat in different localities, but generally the qualifying conditions are well set forth in the rules of the "National Amateur Gardeners' Association" as follows:—"No person shall

be eligible for membership who disposes of plants, flowers, seeds, or trades in garden produce for profit, or is in the employ of a nurseryman or gardener, or is employed as a gardener." Occasional help from a labourer in digging, wheeling, or similar rough work is allowed.* All other actual cultural work this type of amateur must do with his own hands. By some societies a person is not allowed to exhibit in the amateur classes if he has the aid of *any* paid assistance, directly or indirectly, in working his garden. Whatever the show regulations may be, they must be strictly complied with.

An admirable example of amateurs of the first class is found in the President of the Royal Horticultural Society, Sir Trevor Lawrence, Bart., who has sought unweariedly for a number of years, by precept and by example, to create interest in and to advance the prosperity of British gardening. A worthy specimen of the second class is afforded by Mr. Alfred Lewis, of Beckenham, who is employed daily in London from 9 A.M to 7 P.M.; yet he trenches with his own hands all the available parts of his garden in the autumn by lamplight, and won fifty-three prizes in 1897, also the silver medal as the most successful amateur exhibitor at the great co-operative festival show held at the Crystal Palace in August of the same year.

TERMS AND DIFFICULTIES.

There are four terms commonly employed in the classification of schedules—namely, "kinds," "sorts," "species," and "varieties." It is not too much to say that many (though not all) compilers of schedules and framers of classes have no clear conception of the meaning and significance of these terms. That being so, it is not to be wondered at that far larger numbers of exhibitors have hazy ideas as to their interpretation. Moreover, this haziness has many times extended to judges. Thoroughly good gardeners they may be, but they have not closely studied the meaning of all the terms with which they come in contact.

It is highly important for framers of schedules, exhibitors, and judges to clearly understand the relative significance of the governing terms employed in defining the classes.

* When the terms "occasional help" and "similar rough work" cannot be satisfactorily defined, either the "no paid assistance" principle must govern or special conditions framed to meet local peculiarities and requirements.

For the purpose of exhibiting flowers the word "kind" is practically identical with the word "genus" (which consists of an assemblage of species and varieties of kindred plants); but as a class entitled "twelve distinct genera of Hardy Flowers" would appear a little stilted, if not puzzling to many cultivators the more familiar word "kinds" is substituted in schedules. "Twelve bunches of flowers, distinct kinds," whether these be hardy or tender flowers, means there must be one, and one only, representative of the kind or genus. This representative may be either a "species" or "variety," but there must not be both; and if a bunch of, say, Antirrhinums, or Carnations, or any other flowers be staged, this bunch must consist entirely of one variety. A mixed bunch would be open to disqualification. And there must be twelve bunches, no more and no less; there must be no excess of representatives, because the number stipulated (whatever it may be) is definite and inflexible.

We have now to distinguish between a "species" and "variety." That great numbers of persons fail in doing this is evident by the number of "varieties" of flowers which are sent to the editors of horticultural journals to be named. They send what they call six "species" of Azaleas, or of Fuchsias, or of Carnations, or of Roses, or of Chrysanthemums, or of any other kind of flower, and these prove to be not "species" at all, but "varieties," and therefore outside journalistic stipulations as to naming *species* only.

To put the matter concisely, "species" may be regarded as the "fixed" stars of earth, or flowers of nature, which *permanently* represent the genus to which they belong. They remain the same from generation to generation and century to century. Under natural conditions they are not prone to change. The Wild Roses of the far past are the same in our hedgerows to-day, as are the Daisies in our pastures, as well as many old familiar flowers in our gardens.

But when "species" are removed from their natural habitats and given high culture in gardens, they are apt to change after the manner of the wild *Viola tricolor* taken from the cornfields by Lord Gambier, and planted in his garden a little over seventy years ago. Seedlings from the changes thus effected showed still further divergence—the result of pollen influence—and

thus was our present race of Pansies established. The variations thus obtained were not "species," but *varieties*.

All flowers raised from seed which differ from those which produced the seed are varieties, no matter how long the said varieties may have been perpetuated by cuttings or other methods of increase. It is the same with plants raised from "sports." As all exhibitors of flowers ought to comprehend the essential difference between the species and varieties, and as it is certain that many do not so comprehend, no apology is made for these observations. Instructing the inexperienced, I suspect, always has been and always will be the most useful teaching of all.

The word "species" is not nearly so often used as the dominating factor in schedules as was the case a few years ago. This may be the result of disqualifications *plus* the discovery that much better displays of flowers are obtained since its abandonment. An incident at a provincial show is illustrative of both propositions. Prizes were offered for stands of "twelve bunches of hardy herbaceous flowers, distinct species." Thirteen stands were staged in competition. Only one exhibitor was within the conditions, and his stand was the least imposing. The others contained "varieties" of Delphiniums, Antirrhinums, Carnations, as well as of Roses and shrubby Spiræas; or, in other words, the flowers were not all "species" nor all of herbaceous plants. The first prize was given to the least attractive but most correct exhibit, the cards being withdrawn from the others, and extra prizes granted to three of the stands "on their merits," as an equitable method of meeting the case. This was long before the recommendations of the Royal Horticultural Society in its Rules for judging.

As to the word "sort," though still found in some schedules, it ought not to be used in any. It means anything. It evidently applies to "varieties" in most of them, while in dictionaries it is defined as meaning "kinds or species." An exhibitor may "sort" out or choose the best of any of them for his object, but when sorted they are either "kinds" or "varieties" for purposes of exhibition, and except under very special circumstances these two terms suffice. As the word "herbaceous" has been mentioned, it may be said that the most concise definition of it is this. "Herbaceous plants are plants which produce stems annually from a perennial root." ("Johnson's Gardeners' Dictionary.")

It must be understood that it is only for the purpose of exhibiting flowers that the terms "kind" and "genus" are said to be *practically* identical, and if this is not an exact representation it has the merit of being safe, and the farther an exhibitor may diverge from it, the greater the risk he incurs of running himself out of the competition. Some judges have a very strict, others a more elastic way of discharging their duties, and it is best not to give them a chance to disqualify an exhibit. There are exceptions to the identity of the above terms in some fruit and vegetable classes (see R.H.S. "Rules"), but these are usually made clear in schedules, which should be strictly followed.

DUTIES AND RESPONSIBILITIES.

Other matters to be noticed include the positions and obligations of officials and others connected with them, such as (1) the rights and responsibilities of committees; (2) the duties of secretaries; (3) of managers and stewards; (4) of exhibitors; and (5) of judges.

COMMITTEES.—The committee (or council) of a society is the supreme controlling power of its show. It is also the official court of appeal for the settlement of doubts and difficulties, unless the decision on some point is delegated to others, and published in the regulations. As its members are responsible severally and individually for the payment of prize and other moneys, they have as a body the corresponding right of determining the nature and amounts of the prizes in each class, with the principle on which they shall be allocated, as will be hereafter noted. They are also responsible for the production of the schedule, and for all the terms employed therein—a matter of considerable importance.

SECRETARIES.—The secretary of a show may be regarded as the executant of the requirements of the committee, both as to the collection of subscriptions, keeping accounts, registering the decisions of the judges, the disbursements of prizes, and the arrangement and general supervision of the show. Some secretaries are something like autocrats, and seem as if invested with all the powers of a committee. When they, as not a few do, combine zeal not only with ability but affability, and insist on rigid compliance with the rules and regulations of a society, the shows entrusted to these active, courteous, and clear-headed

officials are generally the best managed. *Suaviter in modo, fortiter in re* might well be the motto of the best show secretaries, for they are certainly "gentle in manner, but vigorous in deed"; or, in other words, an iron hand is encased in a velvet glove, as it ought to be. Horticulture owes much to the devotion, untiring labour, sound judgment, and urbanity of the secretaries of societies which are established for the advancement of the art and industry which all who love gardening desire to see in a flourishing state.

STEWARDS OR MANAGERS.—By whatever name these extremely useful secretarial assistants may be known, they contribute materially, not only to the effect of an exhibition, but to the avoidance of mistakes in staging, also in facilitating, the work of judging, for which adequate time is allowed as a rule only at the best conducted exhibitions. Stewards of shows direct the staging of produce, and know where all the classes and exhibits are placed. They ought also, but do not always, immediately after the judging is completed, rearrange as may be needed easily movable exhibits, so that the space at disposal is somewhat equally occupied. Nothing so mars the appearance of an exhibition (except uncovered tables and the exposure of rough packages under them) as alternations of crowded products, be they flowers, fruit, or vegetables, and vacant staging. If the exhibits are disposed more thinly, most of the surface may usually be occupied. Allowing a few inches of space, when this can be done, between class and class is not only permissible but desirable, as it enables visitors to perceive without difficulty where one class ends and another begins. When stages are crowded, and the admirers of the exhibits numerous, it is practically impossible for the separate classes to be distinguished.

Another matter might with great advantage be attended to by the stewards of shows, but is frequently, if not generally, overlooked—namely, satisfying themselves that the show is in proper order for judging—(a) by the *space* (as for groups) allotted not being exceeded, and (b) by correcting accidental *misplacements*.

As to the question of "space." As this is stipulated in schedules by the show authorities it is unquestionably the duty of these authorities to see that it is not exceeded. It is no part of the duty of a judge to measure the space that is occupied by

certain products in which he has to adjudicate. This involves a waste of time, which is not infrequently all too short for the discharge of his legitimate duty. Judges have a right to assume that all exhibits announced on a "space" basis are (if not otherwise specified by show authorities) eligible for competition.

As to "misplaced cards." When a competitor stages in several classes he is apt in the hurry of the moment, and obviously quite innocently, to place a card containing his number on the back to an exhibit where such card ought not to be; either the exhibit is in the wrong class, or the card is. The last named occurs the more frequently, and if one mistake of this kind happen there must of necessity be another. When such accidents are numerous serious delay arises in the rectification when judging. True, the regulations may say "exhibitors are responsible for the correct placing of the prize cards." They cannot possibly be too careful in doing this, and old showmen rarely make a mistake. As the steward knows the number of exhibits in each class in the section of a show over which he has control, he ought to pass along before the judges and see that the cards are right. At some shows much time is wasted by the judges waiting till the errors are rectified. It is true they could pass them, but this might possibly deprive some competitors of two prizes; but the "penalty" would scarcely "fit the crime" in the case of a pure accident, and the desire of a judge worthy of the name is to do substantial justice. He will do it too, if he can, even if he be too late for luncheon.

EXHIBITORS.—"Without exhibitors there can be no show" is a truism that has been uttered a thousand times in proposing a certain post-prandial toast. While admitting the accuracy of the observation, there is something else to be said. Though exhibitors can make the hearts of show authorities glad, they can also make them inexpressibly sad, and this in two very different ways: (1) In making entries, and then failing to fill half or indeed any of the space reserved; (2) in either making no entries at all or making them too late, and then bringing loads of produce to a show and clamouring for space when every inch has been allotted. In this latter case, when the intended exhibits cannot be accepted, the show authorities are often blamed if not abused—a manifest injustice. On the other hand, the non-fulfilment of obligations causes great anxiety and worry to

managers of exhibitions, who are often placed in positions of great difficulty in filling the blanks thus created.

All thoughtful persons will admit the reasonableness of the following points (or they would if they were responsible for the management of a show):—

(1) State on the entry form as exactly as possible the amount of space required where space is not stipulated, as it is in many classes.

(2) Post all entries before the date mentioned for receiving them and not after, as is unfortunately too common—at least so say many secretaries.

(3) They also say, as they are fully entitled, that every exhibitor when he finds he cannot fulfil his entry should at once “wire” to that effect. This would contribute to the peace of mind of the officials, and prevent blanks that it is often impossible to fill at the last moment. It is feared, and in fact stated, that some exhibitors are smart enough to wire when it is to the advantage of themselves, but slow to move in preventing inconvenience to others.

(4) When new or rare plants are exhibited it is instructive when practicable to give their native habitats. It is conceivable, however, that this might occasionally be thought too “instructive” to some enterprising explorer. When new fruits are submitted for the first time, particulars of the site and soil in which they were grown, also the character of the trees, is information that the examiners like to have before them. When new varieties of plants, fruits, or vegetables result from cross-fertilisation the parentage is usually given—even if it is sometimes guessed at.

(5) Entries made by private gardeners should contain the name (or title) and full address of the owner of the produce, signed by the entrant in each case. Cards are very imperfectly filled at some shows, through the omission or illegibility of either the name of the owner or gardener, or the address of either. Some secretaries, who desire to fill in the cards properly, can only do so by consulting horticultural directories, and not always then; while others do not try to obtain the requisite information, but seem to like those methods the best which are the easiest to carry out.

(6) Every owner of the exhibited produce, as well as the

gardener who grows it, is entitled—one as providing the means, the other the skill—to be credited with the exhibits on the show cards ; and as most of the inscriptions can be written in advance they ought to be so bold and clear as to be read by the majority of visitors without removing the cards, which causes obstruction and possible misplacement. The duty of filling in the cards obviously devolves on the officials, but exhibitors must first supply the information in ample time, as many by inadvertence do not. (*See p. 522.*)

(7) Last, but not least, exhibitors should always commence the arrangements of their products soon enough to be able to complete them before the time stated in the schedule for judging to commence. This is done by all the most successful exhibitors at all the best managed shows.

JUDGES AND JUDGING.—At the moment of commencing this section an unexpected communication arrived from Mr. Owen Thomas, V.M.H. ; and as much that he says is so pertinent, it is at once cited, with additions which it is not necessary to indicate, as we both think alike on the subject :—

“ Horticultural exhibitions have so increased both in numbers and importance, and the money value of the prizes distributed throughout the country amounts in the aggregate to such an enormous sum, that the office of judge, at whose discretion the whole of this large amount has to be apportioned, has also grown in importance in the same ratio.

“ Not only is the office an important one as regarded in that light, but it is equally important, if not more so, regarded from the higher ground of honour and pride. Certainly the office of a judge and the result of his adjudications are exposed to a much fiercer light than formerly by reason of the ever-increasing keenness in competition and the greater competency of exhibitors to detect flaws and errors of judgment when such by chance occur.

“ It is difficult to define the qualifications of a good all-round horticultural judge, but there are certain cardinal attributes which all will admit a judge must possess before he can secure and retain the confidence and respect of committees and exhibitors. A good judge must have an intuitive knowledge of the value and rarity of the exhibits placed before him acquired by long experience, practice, and a wide field of observation. He

must be familiar with the best of everything in the domain of gardening, and capable of appreciating the skill that is displayed in its production—knowledge which cannot by any possibility be gained by anyone from books, codes, or rules alone, however closely he may study them.

“It goes without saying that a judge must be favourably known among his confrères for his uprightness of character, unswerving probity, and absolute invulnerability to any extraneous influences whatsoever. He must possess a cool and level head, with good perceptive powers; be able to concentrate attention on the work in hand, exclude all outside topics from conversation, and have the requisite nerve to make up his mind when the right moment comes, never giving a thought as to whom he may either please or offend. A judge must feel that for the time being he is invested with a power, in his small sphere of action, as great as that of the most despotic Eastern potentate, and must also at the same time be impressed with the consciousness that his responsibility is as great as his power. He will then discharge his duties honestly and honourably, even if he should, through the inherent frailties of humanity, happen to err.”

PRINCIPLES OF JUDGING.

Before referring briefly to the routine of judging, it seems desirable to consider the principle on which the prize money is to be distributed. This is a question that the committee must determine. There are two widely differing systems in operation—one ancient, the other modern; one adopted generally, the other resorted to occasionally.

The older plan is the easier, but many persons do not consider it the fairer. It is based on the allocation of a certain sum of money to each class. This is divided into differing amounts, which are specified long before a show as first, second, third, and occasionally more prizes. This is called the “ancient” system, because it has been in operation in contests of various kinds from time immemorial. It is the only system considered in the R.H.S. Code (page 8). An excellent method of dividing the aggregate amount is there indicated; and, seeing that it is based on a definite principle, it is surprising the plan is not more generally adopted.

The alternative modern principle may be shortly described as

the "point value" system, the prize money allotted being divided *pro rata* according to the number of points, or marks of merit, adjudged to the three or four exhibitors (according to the number of prizes determined to be given) in a class.

I have received many letters directing attention to various matters connected with exhibiting, and one writer deals somewhat forcibly with what he calls the present "arbitrary system" of fixing the different amounts. He says:—"We usually see these prizes varying in the first, second, third, and so on, in the proportion of from 20 to 30 per cent. For example, £28 is allocated in a class in four sums of £10, £8, £6, and £4. This presupposes that the third prize collection should be 33 per cent. better than the fourth, the second prize collection 100 per cent., and the first prize collection 150 per cent. above it; whereas in close competitions there is frequently not more than half a dozen points of value difference between the first and fourth collections. On this basis if the £28 were divided according to the 'point value' of each of the four collections the amounts due to the exhibitors would be very much as follows:—First prize, £7. 10s.; second, £7. 5s.; third, £6. 15s.; and fourth, £6. 10s. This shows a difference of only £1 between the first and the fourth instead of £6 under the ordinary system. In some competitions the relative merits of the exhibits are still closer, and when we see a superb collection beaten by half a point only, as sometimes happens, and the cash prize is some pounds less than that given to the first, it must be apparent to every thinking person that the system which establishes such an anomalous partition is manifestly unjust and indefensible. The 'point value' system of apportioning the prizes is no experiment. It has been adopted for several years in a competition of nine dishes of vegetables at Carshalton, always exciting the highest interest, and in every instance giving the fullest satisfaction."

Such is the letter. The last sentence in it I know to be true, as I have been a judge in the class since it was established.

The essence of the "point value" system of judging is based on the principle that every point or mark of merit accorded is of *equal value* (as it is), and can be represented in money. The precise amount is easily determined.

DETERMINING POINT VALUES.

Assuming that four prizes are to be awarded in a class, the "points" secured by those four of the exhibitors who have the greatest number are added together; and the sum set apart for the class is reduced to shillings, pence, or farthings, as may be needed. The division of the result by the total number of points gives the value of each point. The multiplication of this "point value" by the number of points of *each* of the four exhibitors gives the exact sum that is due to them in each case.

The amount of necessity varies according to the total sum allocated, and the number of points accorded to the produce in competition. For instance, in Kent a very complete scheme is in operation of encouraging superior culture in cottage gardens and allotments. The County Council grants a sum for prizes. Originally the amounts were fixed in the ordinary way; but the inspector, Mr. W. P. Wright, F.R.H.S., finding that this was not equitable, some men getting too much, and others too little, according to the quality of their work, proposed that every point gained by a worker should entitle him to a penny, provided he gained a given number of points as representing creditable work.

This "penny a point" system has proved so satisfactory, as tested in upwards of 200 instances, that the few centres which preferred to have the prize money divided in the usual way of fixing the sums beforehand, now desire to have them based on the exact merits of their work. They perceive that several of the first-prize men receive under the old system much higher amounts than they are justly entitled to, while a far larger number, who follow them closely, as second, third, and fourth in merit, are penalised accordingly. The new plan is now called the "fair plan" by hundreds of men, who are worthily striving in friendly rivalry to excel each other in the commendable work in which they are engaged, namely, making their gardens and allotments in the highest degree productive and attractive.

Having given an example of the working of the "point value" system in which the prizes were very numerous, but small (as in the above Kentish instances)—though not in the aggregate smaller than is customary in such cases—it seems desirable now to test the plan where the prizes are high, and

the classes and competitions of a national character. An opportunity is afforded for doing this by tabulating the prizes that *were* awarded in the orthodox way, and those that *would have resulted* if the "point value" system had been in operation in the two great classes at Shrewsbury last year. Here they are:—

DECORATIVE DESSERT TABLE CLASS (Shrewsbury, 1897).

Societies' Prizes awarded	Points recorded, ascertained value 1s. 11d. each	Aggregate "Point Value," excluding decimals
<div> <div>£ s. d.</div> <div>1st 12 12 0</div> <div>2nd 12 12 0</div> <div>3rd 8 8 0</div> <div>4th 5 5 0</div> </div>	<div> <div>105½</div> <div>104½</div> <div>99½</div> <div>96½</div> </div>	<div> <div>£ s. d.</div> <div>10 2 2½</div> <div>10 0 3½</div> <div>9 10 8½</div> <div>9 4 11½</div> </div>
£38 17 0	406	£38 18 2

The reason of the money value of the Society's first and second prizes being equal was the addition of £5 with the Veitch medal to the first prize.

Taking no account of this, but regarding the addition as an award of honour won by one point, advocates of the "point value" system would say that the

1st prize winner had	<i>above</i>	his just due	£2. 2s. 9½d.
2nd	"	"	<i>above</i> " £2. 11s. 8½d.
3rd	"	"	<i>below</i> " £1. 2s. 8½d.
4th	"	"	<i>below</i> " £3. 9s. 11½d.

If the total amount allocated in the schedule could not be exceeded by 1s. 2d., it would only be necessary to deduct 3½d. from each of the prize winners to insure an exact division of the £38. 17s.

VICTORIAN FRUIT CLASS (Shrewsbury, 1897).

Prizes awarded	Points recorded, ascertained value 1s. 7½d. each	Aggregate "Point Value," excluding decimals
<div> <div>£</div> <div>1st 30</div> <div>2nd 25</div> <div>3rd 20</div> </div>	<div> <div>321</div> <div>297</div> <div>294</div> </div>	<div> <div>£ s. d.</div> <div>26 8 3¾</div> <div>24 8 9¾</div> <div>24 3 10½</div> </div>
£75	912	£75 1 0

Deduct 4d. from each prize winner, and the odd shilling is disposed of.

The greater the number of points recorded the smaller is the

value of each, but this in no way affects the actual relative amount in prize money to which each exhibitor is entitled under the "point value" system of apportionment. The figures adduced will satisfy its advocates that the first prize winner had £3. 1s. 8 $\frac{1}{4}$ d. too much, the second prize winner 11s. 2 $\frac{1}{4}$ d. too much, and the third prize winner £4. 3s. 10 $\frac{1}{2}$ d. too little, according to the marks of merit awarded by the judges.

It should be said it is not the duty of judges to determine the relative amounts—they simply hand in their points as usual, and their conversion into money is quick and easy office work, by a simple sum in addition, division, and multiplication, as indicated in the first paragraph on page 518.

This system is now fully placed before the public for the first time, and the public must judge of its merits.

It may be said in reference to this plan that, for the purpose of stimulating competition, the prizes should either be limited to a specified number, as in the ordinary way; or that no competitor shall be eligible as a recipient who does not win a stipulated number of marks, representing commendable work, as for gardens in Kent. The first-named method is the better adapted for shows, and where it has long been in operation the greatest efforts are made by exhibitors first to get within the charmed circle of prize winners, and then to obtain the greatest possible number of points, knowing that every one of these adds its quota to the prize money that will be received. Distributing the total amount offered in a class among the whole of the exhibitors in it would amount to frittering, as some might, and not improbably would, obtain a share whose produce would not be entitled to any recognition on its merits.

Another point to be noticed is this—that while a limited number of classes containing products capable of this definite appraisement might prove of special interest if the prizes were allocated *pro rata* according to the points or marks recorded, to adopt the system in many (much more in all) classes would necessitate a corresponding increase in the number of judges.

"Pointing" takes time, and too much of the time apportioned to the judges, as published in the schedules of shows, is filched from them by late and slow-moving exhibitors, in some cases with little or no interference by the authorities of those shows.

ROUTINE IN JUDGING.

When a show is properly arranged, *i.e.* when the steward has seen that there are no misplacements of exhibits, or of cards bearing the correct class and exhibitor's number, or any omissions of cards, the adjudication proceeds smoothly and as expeditiously as the nature of the competition permits. Experienced judges work quietly and systematically somewhat on the following lines:—

1. Observe the number of prizes offered in a class and the attendant conditions in the schedule.

2. Count the number of exhibits in the class—if only one, give it the prize to which it is entitled—be it first, second, or third. Act similarly in the case of two exhibits only, withholding any prize or prizes of which they are not worthy. A judge must (or should) not only act justly to an exhibitor, but also to the society and to himself. (An exhibitor should also remember that there is more honour in showing well in a strongly contested class and losing than in winning a prize with weak produce in a class in which there is little or no competition.)

3. If the exhibits are numerous, by a quick yet searching glance, at once rule out the obviously inferior, not looking at these again as they are judged; then concentrate attention on the few remaining in competition for the prizes.

This initial routine applies to the judging of all the classes in a show, and all kinds of produce in them.

For marking those exhibits which are ruled out of competition, the class cards may be used. For instance, in long lines of Chrysanthemums, or any other flowers, or in the case of many collections of fruit or vegetables, the cards of those which are “out of it” can be pushed back practically out of sight, while those of the exhibits that require further examination can be usefully drawn forward. This prevents a good deal of needless marching to and fro, or doing work over again that is otherwise often indulged in.

In dealing with heavy competitions in single-dish classes of fruit, such as Apples, Pears, or any other kinds; or of vegetables, such as Potatos, Peas, and Beans, with perhaps twenty or thirty dishes in a class, I know of no better plan than simply placing the cards on all that have no chance of obtaining prizes. The few uncovered have then only to be looked at again, and the work which at first looks formidable is speedily done.

It must be understood that it is a point of honour with self-respecting judges not to turn over a prize card to see the name of an exhibitor. "Names" are nothing to them, the condition of the products everything. After assisting in the examination of many thousands of exhibits, I have never seen a judge of repute turn up a card through motives of curiosity; yet a few societies think it necessary to enclose exhibitors' cards in envelopes, with the requisite numbers for judging purposes printed on them, and these are all the adjudicators want to see.

Usually these numbers are printed across the top side of the cards or of the envelopes which contain them. This is the worst position, for this reason:—When the cards are pushed, as they are under boxes of flowers, or plates of fruit or vegetables, to the extent of two-thirds for security, the numbers are hidden, but if the numbers are near the lower edge of the card they are visible; this therefore is the best position for them.

(On Envelope.)

SPECIAL NOTICE.

This Envelope (with Card enclosed) is to be placed on the Exhibit. After the Judging is over, the Card will be placed in position.

No.	Class.	Exhibit.
4	7	48 Blooms.

(Front of Card.)

WINCHESTER HORTICULTURAL SOCIETY.

THE FIFTEENTH GRAND

EXHIBITION OF CHRYSANTHEMUMS,

FRUIT, FLOWERS, &c.,

At THE GUILDHALL, on Thursday and Friday, Nov. 11th and 12th, 1897.

(Space for gummed Prize Slip.)

No. 4. Class 7 (48 Cut Blooms).

Exhibitor—F. W. C. Read, Esq., Kilmeston Manor, Alresford.

Gardener—Mr. C. H. Holloway.

(Back of Card near the lower edge.)

Exhibitor's No.	Class.	Exhibit.
4	7	48 Blooms

When the numbers are printed along the bottom of the card, and thus not hidden under exhibition boxes or stands, the judges jot down the awards as they are made—first, second, or third, as the case may be.

Reverting to the actual awards, these can be made with accuracy in nine classes out of ten, and often in nineteen out of twenty, by careful comparison, observing closely the merits and defects in the competing exhibits, balancing one with the other in each collection, until a mental estimate of the value of the whole is obtained in each case. When the judges have not a shadow of doubt that their decisions are correct, one of them marks them on the back of the cards first, second, and third, and so on; and the other does the same in the spaces provided in the judging book, or on a card provided for the purpose. It is an excellent plan also for one of the judges there and then to either attach the gummed prize slips to the cards, or to see that this is properly done by an attendant; the possibility of errors occurring is then reduced to a minimum.

If the prize slips are not attached at the time of judging, the secretary or his clerk follows with the entry book for placing the card figures, first, second, third, and so on opposite the names of the successful exhibitors. An excellent judge and ex-show secretary, Mr. E. Molyneux, gives an important reminder, and perhaps a rather hard hit when he says truly: "Some judges, I am sorry to say, make such indistinct figures on the backs of the cards that none but themselves can read them!" Let those whom the "cap fits" put it on.

If either of the judges has a lurking doubt as to the correctness of the impressions arrived at by "comparison," there should be no delay in appraising the value of collections of fruits or vegetables, or stands of flowers, by giving to each item in them the marks or "points" to which it is entitled. If admittedly competent judges agree on the value of each item then the total number of "points" obtained by each competitor will in ninety-nine cases out of a hundred be correct, whatever any persons, who may be taken by surprise, say to the contrary. It is important to decide quickly on the question of "pointing," as it is very easy to lose more time in pacing to and fro among the exhibits, and sometimes getting confused, than would suffice to do the work in the best possible manner.

In commencing the work of determining the exact value, so

far as can be done, of the individual items in a collection, men who have not had much experience in the process, especially if they are of sanguine temperament, are extremely prone to commence pointing too "high." "Here is a glorious bloom!" they say, or "Here is a grand dish!" and down goes the maximum. By-and-by they come to distinctly better specimens. What then? Well, they look rather foolish, and the conceit is taken out of them. Old judges make no such mistakes. Why? Because the conceit has been taken out of *them* before.

Only the very best specimen in any class, if such can be found distinctly superior to all others, should be accorded maximum points. If there happen to be a few of equally commanding merit they would, of course, be equally honoured, but such occurrences are rare. The frequency with which equal prizes are given at some shows represents easy, not to say slipshod, judging, for which experts were scarcely needed.

There are two methods of "pointing," or rather of entering the points or marks of merit, as shown below, one slow, the other quick, but both equally accurate. The last and the best was, so far as I know, initiated by Mr. James Douglas. The asterisks indicate blooms, the figures beneath them their value.

Sample of Revised Edition of H. V. Machin's Judging Card for Roses, &c.

No.	Class	Examples																Row Total	Grand Total	
2	1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Back row blooms & points of merit .	103		
		7	6 $\frac{1}{2}$	6	6	5 $\frac{1}{2}$	6 $\frac{1}{2}$	7	6	7	6 $\frac{1}{2}$	6	5 $\frac{1}{2}$	6 $\frac{1}{2}$	7	6	8	Middle row blooms & points of merit		86 $\frac{1}{2}$
		6	5 $\frac{1}{2}$	5	4 $\frac{1}{2}$	5	5	6	4	5	4 $\frac{1}{2}$	5	5	5 $\frac{1}{2}$	5 $\frac{1}{2}$	6	6	Front row blooms & points of merit		71 $\frac{1}{2}$
		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*			
		5	5	4 $\frac{1}{2}$	4 $\frac{1}{2}$	4	3 $\frac{1}{2}$	4	4 $\frac{1}{2}$	5	5	4 $\frac{1}{2}$	4	3 $\frac{1}{2}$	4	5	5 $\frac{1}{2}$			
		18	17	15 $\frac{1}{2}$	15	14 $\frac{1}{2}$	15	17	14 $\frac{1}{2}$	17	16	15 $\frac{1}{2}$	14 $\frac{1}{2}$	15 $\frac{1}{2}$	16 $\frac{1}{2}$	17	19 $\frac{1}{2}$	Total in 3 rows .	261	

By the first, or "slow," method the blooms are pointed from left to right, the value of *each* set down, involving, of course, 48 entries, or in three collections, 144 entries.

By the second, or "quick," method they are pointed from back to front in *triplets*. Take the first three on the left, thus: Back row bloom, 7; middle, 6; front, 5; added mentally=18; and so on. This results in a saving of 32 entries on each stand, and in the three collections saves 96 entries.

As will be apparent when there are several classes in a show in which pointing is necessary, the saving of time by the triplet method is very material, and may in fact make all the difference between having the work completed before the entrance of the public or otherwise. The last-named method is even quicker than it appears on paper, for experienced judges find it as easy in most cases to regard the three blooms as *one*, and set down their aggregate value, as to appraise them separately. When there is the suspicion of a doubt in the mind of one of them they are valued individually. Though it is well known that exhibitors examine, and very properly, the work of judges closely, it is not so well known that judges watch each other not less acutely. This is as it ought to be, and does not apply to judging flowers alone, but everything on which they have to adjudicate.

Though in the above example the merit gradations are set down in full or in half points, it is under the popular eight-point standard system, originated by myself, just as easy to divide still further, *i.e.* as easy to divide the halves into quarters and set down, say, $7\frac{1}{4}$ or $7\frac{3}{4}$, if the judges cannot quite satisfy themselves that a $7\frac{1}{2}$ entry represents the exact value of whatever may be under examination. This is, as a rule, the quickest way of settling doubts, and the verdicts of competent men could not be very far wrong. As a matter of fact it is rare for them to differ in the work of appraisement; and though I have in my possession at the least 20,000 entries, I do not remember a case in which it was necessary to call in a referee when pointing had been carefully done, and the judges were unanimous in their decisions.

It may, however, perhaps be recorded here that in one instance of judging ninety-six blooms of *Chrysanthemums* for an important prize, two other sets of experts were, with the full consent of the official judges, appointed to test the verdict. One set arrived at one point above, the other one point below, the total number which had been previously handed in, and Mr. George Gordon was a happy man that day.

In judging certain exhibits by comparison, which in their nature are not amenable to having their several items valued individually, and especially when the wording of the class is not so clear as it might be, occasions may and do arise when two judges find a difficulty in arriving at a decision. In such cases

nstead of indulging in long argument, by which both may easily be confused, it is better to call in a referee—a judge who is acting in other classes at the show—and let his vote settle the matter without a word of comment on his verdict by either of the judges.

In large shows requiring several adjudicators, working in pairs is found the best arrangement. Two judges will complete a given number of classes in less time than three, and if the two agree that suffices. At some shows, or important sections of shows, one judge is occasionally relied on. If he be a man of proved capability, not as a cultivator only but as a judge, and the products are amenable to “pointing,” the plan answers; but there are very few men indeed on whom such responsibility should be imposed, and it would not be difficult to cite cases in which “one man verdicts” have led to so much dissatisfaction that the work has had to be done over again. It is better in all cases of doubt to avoid such contingencies. At the same time where the “one judge” plan has been found by experience to be in all respects satisfactory, there would seem to be no valid reason for changing such plan, while security would rest in the retention of the particular man.

THE ASSIGNMENT OF JUDGES.

Large shows are necessarily divided into a number of sections, such as—

1. PLANTS.—Specimens, groups, and Orchids.
2. FLOWERS.—Embracing (*a*) Floral decorations; (*b*) Bunches of hardy and tender kinds respectively; and (*c*) Florists' flowers.
3. FRUITS.—As in (*a*) Collections; (*b*) Grapes, possibly in great force; (*c*) Choice stone fruits; (*d*) Imposing displays of Apples and Pears.
4. VEGETABLES.—In great diversity in collections and specified classes.

Whether the judges number eight or more, they should not only be absolutely indifferent as to whom the prizes are awarded, but they must be able, from intimate knowledge and wide experience, to determine the different exhibits that are the most entitled to the respective honours. The Plant judges should include at least one expert in Orchids. That is important, and it

is equally so that one of the Flower judges have an intimate knowledge of florists' flowers. It is essential that judges of fruits be well acquainted with the varieties, characteristics, and potentialities of the different kinds; while judges of vegetables must have given special attention to this substantial section, and have in their minds clear ideals of the features which in the aggregate constitute the highest standard of excellence in the various kinds.

We may find a body of men selected in which all these requisite qualifications are embodied, but the best is not always made of them. Experienced show officials, who know the particular capacities of their judges, usually assign to them those classes with which they are best qualified to deal; but many instances have occurred of placing them in incongruous positions. For example, a judge specially skilled in plants (including Orchids) and a recognised adept in judging groups, does not find himself in the happiest position when "told off" to the vegetables, though he accepts it pleasantly enough as a novelty; while a first-rate fruit or vegetable authority does not feel himself the most at home among florists' flowers of which he may know little, or in dealing with Orchids, of which he may know less.

A sensible method of assigning the judges was the simple one adopted at a provincial show. "Gentlemen," observed the Secretary, "You know each other, and what you can respectively do, better than I know; please join partners in the best way for judging the show." This was done in two minutes, and the work was completed in a manner that proved satisfactory to all. Let the services of the best procurable judges be obtained, place them in the right positions, and errors in judgment will be reduced to as near as possible the vanishing point. A thorough "plantsman" will not allow some gigantic specimen that may be easily grown in two years to overwhelm another which is in its nature smaller, but has required the exercise of the highest cultural skill over a dozen years to bring it into such superb condition; nor will an orchidist err by allowing a huge plant, about as easy to grow as a Cabbage, to triumph over one naturally smaller, but far more meritorious as an example of cultural skill.

Any product which, in the condition in which it appears,

affords unmistakable evidence of the greatest cultural difficulties having been overcome, and the soundest judgment exercised in its superior presentation, may be regarded as the best representative of the *gardener's skill*; and this, with refined taste in arrangement (if an element in the case), ought ever to be kept in mind by adjudicators.

THE ARTISTIC GROUPING OF PLANTS.

The mention of taste in arranging plants suggests that a little may not inappropriately be said on this subject; and it cannot well be said better than in some observations of my friend, previously quoted, as follows:—"There are no more important classes at our great shows at the present day than the classes for groups of plants arranged for effect, and competitions of cut flowers to fill a certain space effectively come under the same category. There are no classes in which it is easier for a judge to err than in these, possessing as they do so many divergent points of quality and interest. I think that a note of warning is needed to remind judges of the danger to which they are sometimes exposed by the passing charm of what I may call the upholstery and millinery of the body of groups of plants and arrangement of cut flowers for effect in the way of mirrors, ribbons, trimmings, and other artificial adjuncts. This style is all very well to a certain extent, but carried too far it savours too much, to my mind, of the draper's shop and too little of the garden."

By the upholstery is presumably meant those arches and bridges of rustic cork, like gigantic umbrella ribs, which, when unduly obtrusive, have certainly a chillingly artificial appearance; so have those toy-like pieces of mirror introduced to represent water. This method has gone far enough, and if it goes much farther no exhibitor need be surprised if he is defeated one of these days by a simpler, more natural, easy, and graceful association of beautiful plants. At the same time very many groups are still too formal, prim, packed, and smooth, to meet with the approval of persons of taste; and, notwithstanding a number of gratifying instances to the contrary, far too many *Chrysanthemum* groups are undoubtedly spoiled by a bristling forest of obtrusive stakes and a brave display of pots. As the merits and defects of groups are concisely set forth on

page 31, "R.H.S. Judging Code," the subject need not be further pursued here; but space may, perhaps, be afforded for something that has not hitherto been published.

ORIGIN AND HISTORY OF EXHIBITION GROUPS.

As this has not been written, and as few persons are intimately acquainted with the facts, it may be desirable to record them, with accuracy, in the *Journal of the Royal Horticultural Society*. The late Hon. Alexander Leslie-Melville was the originator of these groups; and it may here be incidentally mentioned that his brother, the Hon. William Leslie-Melville, was the first to send seeds of the Deodar (*Cedrus Deodara*) from the Himalayan Mountains, in 1831, to his ancestral home in Fife-shire, where two or three of the first British-raised trees are still flourishing. "The introduction of the Deodar," observes Mr. Veitch, in his admirable "Manual of Coniferæ," "marks an epoch in the annals of British arboriculture." But let that pass.

Mr. A. Leslie-Melville was a great lover of gardening, and President of the Lincoln Horticultural Society. Observing that all the prizes for "specimen plants" went in rotation to those gardeners who alone in the district had structures of sufficient capacity for growing them, and believing that equally good culture was displayed in smaller plants of a decorative character grown by amateurs and gardeners in smaller structures, he proposed in the "sixties," through the *Cottage Gardener*, that prizes should be offered for such plants pleasingly arranged.

His society not responding, he resolved to test the practicability of the matter in a small way, and offered, to working amateurs, a garden frame for the best collection of small plants arranged in the space the frame would occupy, or about 36 square feet. The result was such as to justify the Society in offering in the following year, what was a great sum in those days, prizes of £3, £2, and £1 for larger groups of plants effectively arranged, open to all England. There were ten competitors, and the writer of these lines had the honour of winning the first prize. That was, I think, in 1869. Subsequently a show was held in a suburb of the city, inaugurated by the Vicar of Bracebridge, the Rev. C. C. Ellison, who still takes an active interest in gardening. The munificent sum of £5 was provided

as a first prize, and this was won by the same exhibitor as before in a great competition, the judges being, it may be interesting to state, the late Dr. Hogg, Mr. J. R. Pearson of Chilwell, and Mr. T. Speed of Chatsworth—as fine a trio as ever judged at any show, but, alas ! all gone. The year of this gathering is fixed by the entry in a book “purchased on the field of Waterloo, September 18, 1872,” for which visit, and to the Belgian nurseries, the £5 came in helpful in defraying the expenses—an investment in search of health and knowledge which was abundantly justified by the results.

Such, then, is, so far as I know, the beginning of the grouping system, which has become the prominent feature in the plant classes at hundreds of shows ; and it may perhaps be said that those two first prizes ever offered were won by a departure from the close packing, smooth banking, formal method of arrangement which was adopted by all my competitors in those early days, and which is “so long a dying.” The grouping system gradually spread. Prizes for attractive arrangements of plants were offered and well won in 1875 at Richmond. It was in the same year, also, that this method of exhibiting was raised from a local to a national custom. It was a memorable year in the annals of the Royal Horticultural Society, for in it the South Kensington dynasty was overthrown for ever, and the Society has increased in prosperity accordingly.

In celebration of that great change practically the whole of the London nurserymen joined forces, and, without fee or reward, produced an exhibition of a unique character on August 21st. They brought out their finest and rarest plants in varied sizes, and arranged them in the most picturesque manner. It was an exhibition of groups—the greatest and most diversified ever seen. Commenting on this show in the *Journal of Horticulture* I said :—“The occupation of space in the most effective manner has been well demonstrated. Is it not reasonable that the instruction afforded should be utilised ? Would it not be wise to apportion a given amount of space at shows generally and leave exhibitors to occupy it as they choose, with large plants or small, few or many ? If it would be wise to do so, would it not be also wise to do it well—that is, to offer large prizes, or at least place the space classes on a level with the specimen plant classes at our shows ?”

In no long time groups became general, because of the generous encouragement given to them at many shows. They brought into the competitive arena numbers of persons who would otherwise have been kept out, drew public attention to the decorative value of innumerable small but beautiful plants adapted to their conveniences, and afforded charming examples of delightful and effective plant association. Competitive groups have done nothing but good—even the *bad* ones, these acting as examples for avoidance.

Let it be understood that in these observations nothing is implied as to the superiority of groups over skilfully grown and nobly represented specimen plants. Nothing gives such weight and dignity to a show as the magnificent “Cypherians,” but there do not appear to be many cyphers left equal to producing them after the manner of those indigenous to Cheltenham.

DIFFICULTIES IN FRUIT CLASSES.

Difficulties are incidents of life, and judges of garden produce encounter a fair share. They are the most common in fruit classes, and especially, perhaps, with Grapes. For example, Mr. Owen Thomas writes:—“An exhibitor will show fine examples of Black Hamburgh Grapes, well set up, large in bunch and berry, but lacking somewhat in colour and finish; another exhibitor shows bunches which are not so large, but of good shape, and the berries also a trifle smaller, but which carry a perfect bloom, and are in other respects faultless. The majority of good judges (but not all) would attach less weight to superiority in size than to superb quality and high finish; and in my opinion they would be right. This indicates a principle which might with advantage be kept in mind in judging high-class fruit.”

I quite agree with Mr. Thomas, and we are both in accord with the R.H.S. Code (page 13). Many times in such conflicting cases I have put this question to a judge: “Supposing you were expected to furnish the best possible dessert to-night for a party of distinguished guests, and either of these two exhibits of Grapes was at your disposal, which should you choose?” In nearly all cases, if not in every case, he has been drawn from the very large bunches with somewhat faulty berries to the smaller yet excellent bunches of practically faultless Grapes.

In my opinion superiority in quality, cultural finish, and attractive presentation, in all kinds of garden products whatsoever, should be more highly estimated than superiority in size alone, accompanied by apparent defects.

One of my own rules for judging is this. Specimens with the *fewer faults* should win the *higher prizes*. It has been put to a severe test on many occasions in determining the premier bloom in a Chrysanthemum Show—one bloom out of many hundreds. Discover a specimen with which no fault can be found in size, form, fulness, substance, freshness, and clearness of colouration, free from spot or blemish; find another equal, or rather larger, in size, but in which small faults are visible in some other respects. Which is entitled to win—the faulty or the faultless? The last named wins, as it ought. Apply the principle to other products, and you will not go very far wrong in your decisions.

Mr. Thomas directs attention to another judge-puzzling class, namely, “such varieties of Grapes as Alicante, Gros Colman, Gros Maroc, Gros Guillaume, and grapes of this inferior class, pitted against varieties such as Black Hamburgh, Madresfield Court, Mrs. Pince, Muscat Hamburgh, and others of that character. As well,” he says, “pit a race-horse against a van-horse, or an Alderney against a shorthorn at a cattle show.” He thinks each of these two sections of Grapes should have a class to itself, when they can be judged on their merits. Mr. John Easter is of much the same opinion. As he wishes to bring the Frontignans and other small rich-flavoured Grapes into more extensive cultivation, he would stipulate for “well-grown and well-finished bunches, to be judged by flavour.”*

Many prizes have been offered for the best flavoured Grapes, and a large proportion of them have gone to some of the most dingy, miserable-looking specimens imaginable, which displayed no skill in cultivation. They were akin to numerous scrubby little Melons which happen to possess flavour, but are no credit to the cultivators all the same. The R.H.S. very properly insists on *some* evidence of culture by stipulating that

* Mr. David Thomson suggests that “collections” of Grapes should consist of varieties to be specified in schedules, or in other words that each competitor must stage the same varieties in his collection, instead of diverse varieties being pitted against each other in the orthodox way.

Melons to be eligible for prizes should not be less than 15 inches in circumference.

What may be termed the "Flavour Grape" competition proposals are good, but unless good culture is also an essential, and in evidence, the exhibits would be so weak and poor in appearance that the varieties would be more likely to repel than to attract, and to decrease rather than increase in cultivation.

Until such "flavour" classes are provided as suggested, we have to accept facts as we find them; and if we find, as we do, the heavy "cart-horse" Grapes and the more refined "racer" types exhibited together, they have to be dealt with. This is a difficulty which cannot be evaded, and must be surmounted. In searching for the best and most equitable way of doing this, we must not overlook the existence of an indisputable concrete fact, namely, that neither late Grapes, late Apples, nor late Pears can be judged by flavour at a summer or early autumn show; but they *can* be for "cultural excellence." A determining factor, then, is, Which displays the higher cultural merit *for the respective varieties*, or which has the fewer faults, apart from flavour, which is not yet in some varieties developed, and this from no possible fault of the cultivator?

Here comes in the importance of having judges who thoroughly understand Grapes and the characteristics of varieties, including their ease or difficulty of cultivation. Such a judge would not be prone to err by rating a cluster of Alicante, weighing 4 or 5 lbs., many if any points higher than a full and well finished bunch of Madresfield Court or Muscat Hamburgh, a pound or so lighter. On the other hand, he would not allow flavour alone, as represented in a poorly grown bunch of any variety of Grape, to ride triumphant over another infinitely more meritorious as an example of superior cultivation. An episode in practice will make the point clear.

Three bunches of Grapes were in competition at a November show—Muscat of Alexandria, Mrs. Pearson, and Foster's Seedling. "Oh," observed one of the judges, "the Muscat must be first, of course!" "What!" rejoined the other, "why, it is only a fifth-rate sample of what a Muscat should be, while Mrs. Pearson is a first-rate sample. Did you ever see a better example of it; full of fine clear berries, and probably 3 lbs. in weight; and did you ever see a much worse Muscat?" "Oh, well," was

the hesitating response, "if you look at it in that way. But 'flavour,' you know!" He was invited to taste Mrs. Pearson, and say if it is third-rate. He tasted, and with a look of surprise said: "Why, it's *good*; I think it will have to be first, after all." First it was by far, Foster's Seedling second, and the dragging strip of Muscat, without the suspicion of a shoulder, third. Given equal excellence in cultivation in two bunches, then the casting vote might well go to the variety possessing as such the best flavour, even if this were not quite developed at the time.

When there is a conflict of nearly evenly balanced merits let a judge who knows what a bunch of any particular variety should be to entitle it to be regarded as "first class" ask himself this question: "If I were the grower of these two sets of Grapes of which of them should I be the more proud, and if I could only exhibit one set for a prize which should I choose?" He will then extricate himself from the difficulty in deciding, and need not concern himself about what the loser may say. If he is wise he will say little, but just make up his mind to win in the next contest.

WINNING AND LOSING.

If bearing their honours meekly, as most successful exhibitors at our shows do, is a virtue, enduring losses and disappointments bravely is a greater virtue still. This is happily the rule, and consequently any violent departure from it stands out the more boldly, and it is seldom that an exhibitor now humiliates himself by vulgar abuse of a judge who has honestly done his duty. It is reported of the estimable Dean of Rochester who, after judging a Nottingham Rose Show, came in contact with a violent loser—"My friend," the Dean is reported to have said, in his own inimitable way, as he laid his hand gently on the man's shoulder, "my friend, I always said if ever I went mad it would be over the Rose." The rebuke so happily conveyed went home and the storm ceased.

Some few years ago one of the best of gardeners and of men was taken by surprise by being placed second instead of first with a collection of vegetables at Winchester. Rushing in his impetuous way to find the judges he encountered one of them. "Am I to understand," he demanded in excited tones, "that you judged the vegetables?" "Yes." "What, you!" he exclaimed still louder. "Yes; what is the matter with them?" "Matter,

why it's scandalous! You had better go home and *never judge again*." He calmed down eventually, as was his wont, and was then invited to the collections. "You could not have pointed them," he remarked. No reply. "Very well," he went on, "I will show you." "Yes, you name the points and I will put them down," which was done. "Now then add them." "No; better do the others first, and add all up together." This was done, and his collection lost by one point on his own judging. "Now, my friend, I will show you my points." "What! then you *did* point them?" "Yes; very carefully, and here they are." They were exactly the same as his own. He gripped the judge's hand. "Come again," said he, "if you will, I promise never to find fault with a judge again." That splendid gardener and warm-hearted man was the late William Wildsmith.

A parallel case occurred at a Chrysanthemum Show. The loser of a silver cup for blooms was vowing vengeance on a "London judge" if he could find him. The judge was taking note of the blooms later in the day when accosted as a visitor. "Do you understand blooms, sir?" "A little, and I have found some good ones here." "I should think you have, and I am done out of the cup by a London ignoramus. They say he has gone, and a good thing for him." The judge invited the injured exhibitor to "go through" them with him, intimating that if the judges had blundered they should be "shown up." He nominated the points and agreed to every one put down for the forty-eight blooms in both stands, and his own lost by seven points. He was then shown that in the opinion of the judges he had only lost by six! On being asked what he had further to say he replied, "What can I say but that I have made a fool of myself, and am very sorry; I am a young man and have learned a lesson." It is very easy for judges to be condemned after a two minutes' inspection of work over which they have taken infinite pains. They do not object to give reasons for verdicts if appealed to in a reasonable way. "So you have gone against me, Mr. M.," observed a loser to a judge at a western show last year, "but let me tell you that I think my opinion is as good as yours." "I have no doubt at all you think so," was the response, "but, you see, my opinion happens to have the most weight to-day. Good afternoon."

Let my last word on the subject be this:—Exhibitors who fail to win prizes should search, calmly and patiently, for the cause of the failure. The losers of to-day, who profit by experience and persevere, are the winners of the future.

DISQUALIFICATIONS.

Either through oversight or accident exhibitors' products are found at most shows not in exact accordance with the terms of the schedule: one may have one dish too few or too many, in a collection; or one fruit too many or too few, in a dish. Has a judge the right to add to or take from the produce of any exhibitor? He has no such right. He has nothing whatever to do with the staging. It is the duty of the show officials to superintend that. A judge is entitled to draw the attention of the official in attendance to such defects, and *he* can make the correction if he likes. When small departures are observable in several or all the exhibits in a class and the show authorities are satisfied they are pure accidents, and obviously not made with intention to deceive, the judges are told not to disqualify but to award the prizes on the merits of the products. That is simple common sense, which has been described as the best sense of all.

But in most shows errors are found which cannot be rectified if the show authorities even desired them to be so. They have perforce to be passed over by the judges as "out of competition." In most of such cases it suffices to mark the cards "not in accordance with the schedule." If there is reason to believe that a departure has been made with the intention to deceive, then the stronger term "disqualified" may be employed. This in the estimation of many exhibitors and visitors implies a reproach (and perhaps as well so), which the milder term does not. Recently it was reported that a number of exhibitors were "disqualified" because their products were not named. If the schedule distinctly stated that disqualification must follow on such omission the judges had no option; if not, it was an unusual proceeding. Some names are so grotesquely spelt, and attached in so slovenly a manner, that it would be better if there were no names at all. If all unnamed exhibits were disqualified there would be something like a smash at many shows. While

it may be well to have "a giant's strength it is not always wise to use it as a giant," but discriminate.

Everyone interested in the subject of horticultural exhibitions and schedules should closely study the R.H.S. Rules for Judging, as many small points of very great importance are embodied therein.

THE END AT LAST.

It will be observed if there is one injunction more prominent than another in this, I fear, tedious paper, it is the importance of attending closely to small matters by committees, secretaries, stewards, exhibitors, judges. The full significance of so-called trifles has been more forcibly expressed by the poet Young than anything that I can say. It is condensed in three lines, with wisdom in every word:—

"Think nought a trifle, though it small appears;
Sands make the mountains, moments make the years,
And trifles, life."

CHRYSANTHEMUM SPORTS.

By the Rev. Prof. GEO. HENSLow, M.A., V.M.H., F.L.S., &c.

[Read December 14, 1897.]

INTRODUCTION.

ACCORDING to Mr. W. B. Hemsley's investigations, our garden Chrysanthemums of Eastern origin consist of two species, *C. indicum*, L., a small yellow flowered species; and the larger flowered *C. Morifolium** (*sinense*, Sab.). The former appears to be origin of the Pompon varieties; the latter, together with possible hybridisations, the source of the larger flavoured Chrysanthemums.

The immense variety now existing among these flowers is partly the result of the numerous crossings and recrossings which have been made between variously coloured ones, coupled with subsequent dissociations of colour and reversions to more primitive types, and partly to seminal variation.†

No microscopic differences of importance are to be detected.

* The earliest reference (1696) gives the name *Matricaria japonica, maxima, flore roseo*. See *Gard. Chron.* Nov. 23, 1889.

† I have to thank numerous correspondents for the examples herein given of the various sports with which they have kindly supplied me, as well as many interesting observations upon them.

The changes are mostly in the colouring matters of the cell-sap alone. These may be in a single layer, or one coloured layer of cells may be superposed on another, their colours becoming thereby blended.

With regard to the supposed evolutionary sequence of colours in flowers, I will here quote what I have written elsewhere * :—

Botanists are pretty well agreed in their belief that yellow was the primitive colour of true flowers, which were first evolved through the missing links between Gymnosperms, *i.e.* Firs and their allies, and Angiosperms, which include all other flowering plants; then pinks, reds, mauves, purples, and lastly blues were gradually acquired; though as yet the last colour has not appeared in the genus before us.

When, therefore, a coloured or white *Chrysanthemum* sports to yellow, which is frequently the case, it may be regarded as a reversion to the typical or original colour indicated by the name *Chrysanthemum*, *i.e.* a Gold-flower.

White is, of course, the arrest of all colour, and Mr. Forsyth observes † :—"It appears that lilac flowers are the most sportive, and that they frequently change to yellow. . . . Also that nearly all the colours are capable of sporting to white," the exception being the primitive colour, yellow; the nearest approach to this is perhaps seen in the early flowering *Madame Desgrange*, the flowers of which open of a sulphur yellow, but change to a pure or nearly pure white in the fully expanded flower.

Mr. John Salter mentions the peculiarity of some *Chrysanthemums* of sporting and then reverting:—"The variety called 'Changeable Buff' is a remarkable instance of this, and has been known to produce on the same plant buff as well as rose-coloured flowers; another season the blooms from the same root have been entirely buff, while the following year every flower has been rose. The same mutability occurred in the sulphur variety, which was apt to change, either wholly or in part, to golden yellow, and after a lapse of time to return to its original colour, as is sometimes the case with 'Formosum.'" ‡

* "Chrysanthemum Sports." A paper read at the Conference of the National Chrysanthemum Society, Nov. 10, 1891. Paragraphs from that paper are embodied in the present one.

† *Gardeners' Magazine*, April 20, 1872.

‡ "The Chrysanthemum," p. 41.

That climate has something to do with some changes seems borne out by a fact lately recorded, though it may be only temporary in the case in question. Mr. E. Hughes-Gibb thus writes (November 20, 1897) * :—" We have had little frost here (Tarrant Gunville, near Blandford, Dorset) and many flowers which are ordinarily out of bloom at this season still persist. The changes, however, in their normal colours are in some cases very remarkable. The Red Cactus Dahlias are blooming almost orange, the outer florets being often nearly yellow. These Dahlias are also, in many cases, showing a tendency to revert to the single form. A species of *Tropæolum*, normally vivid scarlet, is blooming in a cool greenhouse, where air is kept on, and has, in some cases, reverted almost to a clear yellow, a streak of red down the centre of the petal being the only remains of its normal colour †. . . . A species of *Myosotis*, ordinarily of a deep and very vivid blue, is flowering now a clear rosy pink, without the least tinge of blue. . . . Lastly a pure white *Phlox* of dwarf habit shows a tendency to revert in some of its blooms to a greenish yellow hue."

SPORTS FROM YELLOW.—Commencing, then, with the presumably primitive colour, yellow: Of thirteen examples of a flower of one tint of yellow, the sport has assumed another tint of yellow; and the rule appears to be that the colour is intensified in the sport, as may be gathered from the addition of some qualifying word to the original name. As ammonia is well known to deepen colours, we may see here a possible cause. It will apply to other colours as well as yellow, as, *e.g.*, the red in Balsams, &c. Phosphoric acid also enhances the inflorescence of plants; so that we may get a hint as to phosphate of ammonia being a probably useful ingredient for improving the *tone* of colourisation in Chrysanthemums.

The following are examples of yellow sports, arising on plants bearing yellow flowers, but of a different and generally a lighter shade :—

* *Nature*, vol. lvii. p. 100.

† I have constantly noticed scarlet *Tropæolums* when spared by the frost turn yellow as the autumn advances.—Ed.

YELLOW to YELLOW.*

Annie Salter	<i>Sport</i> , Orange Annie Salter.
Mme. Loderan (sulphur)	Mrs. M. Russell (deep yellow).
Golden Empress of India	Mrs. Robinson King (deep yellow).
Mme. Desgrange (sulphur to white)	Mrs. Burrell (pale yellow).
G. "Wormig" (yellow) "	G. Wormig (yellow).
Lord Alcester (primrose)	H. Hawkins (golden yellow).
Miss M. A. Haggas	John Lambert (straw).
Mr. G. Glenney (sulphur)	Rd. Parker.
Golden Beverley	Golden Geo. Glenney.
Dr. Brock (orange yellow)	Mr. Bunn† (deeper yellow).
Primrose League	Golden Dr. Brock.
	A. H. Wood (light yellow).

BRONZE SPORTS.—Though bronze-coloured sports have arisen from plants bearing yellow flowers, yet, as will be seen, they appear to come more readily on plants with pink flowers :—

YELLOW to BRONZE.

Mrs. Norman Davis (golden yellow)	<i>Sport</i> , Chs. Gibson (deep bronze red, with cinnamon fawn centre).
Jardin des Plantes (yellow)	Bronze Jardin des Plantes.
Mr. Bunn (yellow)	Beauty of Hull (bronze).

SPORTS FROM REDS.—These may be of various tints, and are common. Reds appear to have followed yellows in the natural evolution of colours, but, *as a rule*, the groups of reds and their allies, which include purples and mauves, are due to coloured fluids, in the cells, whereas yellows are due to solid granules. As with yellows, so with reds a common form of sport is simply a deepening of the tint ‡ :—

REDS, &c., to REDS, &c.

Prince of Wales (dark violet purple)	<i>Sport</i> , Cobay (ruby red).
Queen of England	Alfred Salter.
Miss Mary Marrant (pink)	Mrs. Marigold (flesh-coloured).
Dr. Sharpe (crimson purple)	R. Smith (crimson).
Novelty (blush)	Alfred Lyne (rose-lilac).
Vivian Morel (mauve)	Lady Hanbare (cerise).
Miss V. Tomlin (violet purple)	Lucy Kendall (coral red).
Princess of Wales (rosy blush)	Miss V. Tomlin (violet purple).
Surprise (rosy flesh)	Gain of the Museum (deep lilac).

The last, mentioned by M. Carrière in 1856, bore in 1862 one branch with pure white flowers; on another were flowers

* The total number of sports recorded in this paper is 100; so that the number in each group is the percentage of that kind, and shows the degree of frequency.

† A root-sport.

‡ Haworth, in a paper on Chrysanthemums in the "Horticultural Cabinet" for 1833, p. 73, mentions that the "rose" or "pink" sports to "paler pink" for "deeper pink," also to buff, copper, or light orange, and thence to bright yellow, *i.e.* complete reversion.

half-rose and half-white. Both varieties were permanently retained by budding.

The next important change is from pink to bronze. These, as stated, are much more numerous than are bronze sports from yellow-flowered parents :—

PINK, &c., to BRONZE.

Lady Hardinge	<i>Sport</i> , Mrs. W. Shipman.
Princess of Wales	Mrs. S. Coleman.
Princess Beatrice	Geo. Cockburn.
Prince Alfred	Lord Wolsley.
Blushing Bride	Bronze Bride.
Lady Slade (lilac pink)	Angelina (golden amber bronze, shaded with cinnamon).
Prince Alfred (rose-crimson)	Lord Wolsley.
Queen of England (blush)	Bronze Queen of England.
Robt. Pitfield	Geo. Haigh.
Vivian Morel (mauve)	Ch. Davis (bronzy rose).
Wm. Tricker	Mrs. E. S. Trafford.
Mrs. C. H. Payne (rose pink)	Mrs. G. W. Palmer.
Baronne de Prailley (pale rose)	Carew Underwood.

As an example of a converse to the preceding sports, the following case may be mentioned :—

BRONZE to RED.

Lord Brooke (orange bronze) . . . *Sport*, Mrs. J. Cooper (dull crimson).

Five instances are recorded of a buff or fawn-coloured sport appearing on a rose or bronze-flowered parent.

ROSE OR BRONZE to BUFF OR FAWN.

Triomphante (white shaded rose)	<i>Sport</i> , A chestnut buff.
Empress Eugénie (rose lilac)	Fawn-coloured.
Robt. Pitfield (rose)	Geo. Haigh (bronzy buff).
Bronze Queen of England	John Doughty (delicate fawn, shaded with light bronze).
Hero of Stoke Newington (rose pink)	Lady Dorothy (pale crimson buff).

As illustrations of true reversions from red to yellow, the original colour of the flowers of the Wild Chrysanthemum, there are the following examples :—

ROSE OR PINK to YELLOW.

Wm. Tricker (pink)	<i>Sport</i> , A yellow.
Ch. Davis (bronzy rose)	Yellow.*
M. G. Grunerwald (pink)	Yellow.
Mary Anderson (blush)	Miss Annie Holden (yellow).

GREEN SPORTS.—The strange reappearance of the most

* The reverse of the florets a primrose shade. B. M., *Jour. Hort.* Dec. 1897, p. 532.

primitive colour (green) is now well established. This reminds one of the green rose, in which chlorophyll has retaken possession of all the floral appendages, and the flower thus becomes foliaceous or "leaf-like." In the "green" Chrysanthemum the corollas are only "sub-virescent" (somewhat green) without being foliaceous. Green flowers are, however, not always due to chlorophyll; for Professor Church has discovered that the blue-green colour of the flowers of a species of *Ixia* is due to a modification of the common blue or purple colour of many other flowers, &c.; but in the case of Chrysanthemums it is probably the presence of chlorophyll which accounts for the green hue.

WHITE SPORTS.—By far the commonest kind of sport upon Chrysanthemums bearing flowers of pink or rose shades of colour is to a nearly or quite pure white. The following are examples:—

PINK, &c., to WHITE.

Queen of England	.	Sport,	Empress of India.
Princess of Wales	.	"	Mrs. Heale.
James Salter	.	"	Lady Selborne.
Christine (rosy blush)	.	"	White Christine.
Venus (violet)	.	"	White Venus.
Bouquet Fait (rich rose)	.	"	Mrs. Eorton (cream).
Wm. Tricker	.	"	A pearly white.*
Hero of Stoke Newington	.	"	Creamy white.
Vivian Morel	.	"	White.†
M. G. Grunerwald	.	"	White.

The absence of all colour may probably appear in the flowers of sports and seedlings of all plants; and what has been discovered is its great use in intercrossing; for, to speak metaphorically, it has the power of breaking up compound colours. Thus the old bronze *Abutilon striatum* produced no change until it was crossed with a white flowered seedling. This mixed colour then gave rise to pure pinks and yellows. The same result has occurred in Begonias and *E. I. Rhododendrons*.

With regard to variations from white flowered Chrysanthemums, there are numerous instances of the appearance of yellow sports. Such is, of course, a restoration or reversion to the primitive type of colour. Madame Desgrange normally changes on expanding from a sulphur yellow to white; so

* Mr. W. Buffham has forwarded me a nearly white sport from Wm. Tricker this year, and observes: "The same plant has also produced one bloom half-yellow. This year the flowers are very pale, but scarcely white, and at present do not show any yellow." Nov. 24, 1897.

† W. Buffham, 1897.

that it is not surprising to find it sporting to a good yellow :—

WHITE to YELLOW.

Elaine . . .	<i>Sport</i> (yellow).
Vesta . . .	„ (yellow).
Mrs. Rundle . . .	„ (deep yellow).
Princess Planche . . .	„ Jeanette Sheahan.
La Triomphante . . .	„ Golden yellow* (light yellow).
Mme. Carnot . . .	„ J. G. Warren.
Christine . . .	„ Miss Alice Robertson.
Meg Merrilies . . .	„ Mr. Ralph Brocklebank.
Lady Selborne . . .	„ Helen Selborne.
Primrose League . . .	„ A. H. Ward.
Mme. Desgrange . . .	„ G. Wormig.
Princess of Teck . . .	„ Mrs. R. Davis.
Mrs. Heale . . .	„ Miss M. A. Haggis.
Empress of India . . .	„ Golden Empress of India.
Lady T. Lawrence . . .	„ Kate Mursell.
Mme. Lacroix . . .	„ Mr. C. E. Shea.
Mrs. Rundle . . .	„ Mr. Geo. Glenney (sulphur).
Lady Margaret . . .	„ Miss Annie Lowe.
Eve . . .	„ Mabel Ward (golden yellow).

WHITE, SPORTING TO VARIOUS COLOURS.—Just as seedlings from white-flowered plants are often various,† so is it with white sporting Chrysanthemums. Thus Cedo Nulli, a white-flowered variety, gave rise to yellow, lilac, brown, and also other white sports; similarly Queen of England, which is a tinted or blush-white, has sported into at least six different colours as well as white, namely, two golds, two bronzes, a rose, and a primrose.

Pink or shades of rose sporting from white may possibly indicate reversions, or rather “restorations,” to ancestors with similarly coloured flowers. The following are examples :—

WHITE to PINK, &c.

White Venus	<i>Sport</i> , Weston (rosy lilac).
Mlle. Lacroix	„ Pink Lacroix.
Ethel . . .	„ Pink Ethel.

SPORTING FROM TINTED WHITES.—Numerous cases are mentioned in which the flowers are described as having a “pearly,” “ivory,” and “creamy-white” tint or a delicate blush. Such are due, presumably, to the retention of a minute

* Received from Mr. W. Buffham, Nov. 25, 1897.

† Thus, in Sharrock's “History of the Propagation and Improvement of Vegetables” (1672 A.D.), the author writes: “If the flower [tulip] be white or whitish, spotted, and the bottome blew or purple . . . this is beyond all other the most excellent . . . to beget the greatest variety”—i.e. from seed (pp. 51, 52).

quantity of colouring matter, so that the flowers do not acquire a pure white. Such, therefore, may even more readily revert to the colour from which they may have, with some degree of probability, been derived; or, if to yellow, then it is a true reversion.

TINTED WHITE to VARIOUS COLOURS.

Mme. J. Laing (rose-tinted)	.	<i>Sport</i> , Sarah Owen (golden bronze).
Novelty (suffused rose)	.	Alfred Lyne (rosy lilac).
Princess of Teck (ivory white)	.	Hero of Stoke Newington (rosy blush shaded with purple).
"	"	Lord Eversley (white, tipped with green).
"	"	Mrs. Norman Davis (golden yellow).
Beverley (ivory white)	.	Golden Beverley (canary).
Princess of Wales (pearly white)	.	Violet Tomlin (purple rose).
"	"	Mrs. S. Coleman (bronze).
"	"	Mrs. Heale (cream).
White Globe (creamy white)	.	Mrs. J. Crossfield (rosy pink).
"	"	Yellow globe.
Mrs. Heale (creamy white)	.	Miss M. A. Haggis (yellow).
"	"	Mary Tomlin (deep pink).
Queen of England (blush)	.	Golden Queen of England.
"	"	Emily Dale (straw).
Lady Hardinge (delicate rose)	.	Mrs. H. Shipman (fawn).
Elsie (cream-white)	.	Golden Elsie.

SPORT FAMILIES.—It is well known that some Chrysanthemums sport much more freely than others. As an illustration the "Queen of England" is probably the best, and I am indebted to Mr. C. Harman Payne for supplying me with the following interesting genealogical table:—

Queen of England (blush-white seedling, 1847)—*Sports*, Alfred Salter (lilac pink, 1856), Golden Queen of England (1859), Emily Wall (straw-coloured), Bronze Queen, John Doughty (delicate fawn), and Empress of India (white, 1861).

Empress of India—*Sports*, Lord Alcester (1882), Golden Empress (1887).

Lord Alcester—*Sport*, John Lambert (straw, 1891).

Golden Empress " Mrs. Robinson King (deep yellow, 1891).

CHANGE OF FORM IN SPORTS.—Besides colour, the form of the florets may be altered in the sport, though this appears to be less common than of colours. Thus in a sport of Source d'Or, half the flower-head consisted of spreading, flat, canary-yellow ray florets, while the other half of the flower-head was composed of recurved dark golden-bronze florets with revolute edges. Mr. Molyneux says of incurved George Glenney that in the garden of Mr. Horril at Havant it sported to a true reflexed type, which is known as Mrs. Horril. Mr. Gallier, of Edgbaston, records how

“ a completely tasselled Japanese variety with pale pink or flesh-coloured florets, which were long, narrow, and very full, arose as a sport from the fine incurved show pink variety, Miss Mary Morgan.”* Mr. E. Molyneux has observed only five instances, to his knowledge, in which the form of the flower was altered in sporting. He mentions the case of G. Glenly, and adds†:—“ Mr. Forsythe (white Christine) produced a partly incurved variety—John Bradner—retaining the parent colour. Princess Teck (incurved) has borne a flower of the reflexed type, quite white, having lost the blush of its parent. King of Crimson has produced an Anemone-flowered sport, Mrs. R. A. Mudie; the Jap. Madame J. Laing produced a yellow sport, Mr. D. B. Crane, in which the points have an elegant droop and a slight twist, which I have not seen in any other variety.” Haworth, in his paper mentioned above, recalls the “ Expanded Light Purple ” as sporting to the “ Quilled Light Purple ”‡ and that the “ Incurved Lilac ” sported to the “ Curled Blush.”§ Madame Watther produced a curious sport in 1895 with Mr. Cannell. It is an Anemone-flowered Japanese variety, and in the sport there were at least five different forms of florets with numerous intermediate ones. The ray florets were spreading, long-tubed, and ending with spoon-like extremities: these were followed by a circle of incurved narrow florets; then came recurved florets with slender tubes; while the central part had minute recurved florets as well as regular yellow tubular bisexual flowers.||

SIMULTANEOUS SPORTING.—That climatal conditions, over which one has no control, may bring about sports has been suspected from the well-known fact that sports often appear simultaneously at various places and in the same season. Thus, the lilac-purple Baronne de Prailley threw a fine brownish-orange sport (Carew Underwood) at two or three places simultaneously, and in the same form.¶ Mr. Molyneux supplies another illustration, in the case of Boule d'Or, which produced a chestnut-coloured sport both in Hants and Lancashire. Madame Carnot produced a canary-coloured sport, both with Mr. Lowe

* *Gardeners' Chronicle*, 1880, p. 819.

† *Ibid.*

‡ “ Hort. Trans.” vol. v. pp. 145 and 421.

§ *Ibid.* vol. vi. p. 326.

|| *Gardeners' Chronicle*, 1875, p. 639.

¶ R. D., *Gardeners' Chronicle*, December 7, 1889, p. 656.

and Mr. Wells.* Again, Vivian Morel (mauve) produced Ch. Davis (bronzy rose) in two places at once. Vivian Morel also produced a light pea-green sport in two places, viz. at Harpenden and in France. Empress of India (white) reverted to yellow (primrose) in two places simultaneously, and was called Lord Alcester and Princess Imperial. Lastly, "D. B." writes in the *Garden* (December 11, 1897) about Madame Carnot:—"This handsome variety has sported in all sorts of places," the yellow sports being "identical in form and colour. In addition there was evidently a third sport . . . which secured for Mr. Mease the prize for the premier Japanese bloom. . . . During the present season sports of a similar colour have been heard of in different parts of the country; and within the past few weeks a sport of the same colour has been developing in my collection—a lovely soft pale yellow." The suggestion at once arises that such simultaneous sporting may sometimes, at least, be due to the common practice of florists "sending out" a large batch of a new variety all over the country and abroad in one season. And if such individual plants sported immediately afterwards, one might suspect that the power was inherent in the parent from which all the cuttings sent out had been derived; but, as R. D. observes, "a variety may pass many years without showing any inclination to sport, and then, all at once, sports appear in all directions."† When such is the case, the above idea seems to be negatived. So that this fact certainly suggests that the sport is due to some climatal conditions prevailing uniformly over the various districts where the sports occurred. It has also been observed by Mr. Payne that nearly all the early imported varieties from China were much more inclined to sport than the majority of those since raised from seed. The old purple, the expanded light purple, the quilled light purple, the curled lilac, and the buff seem to have been those most sportive in olden times. Now, if the above facts warrant one in regarding climate as an inciter to sporting we have an obvious means of encouraging, if not of actually producing, them by frequently introducing plants from as different a climate as possible from our own—say Jersey, Portugal, South of France, Italy, and America, in which

* *Gardeners' Chronicle*, Dec. 5, 1896, p. 696.

† *Ibid.* 1889, p. 656.

countries our more stable sorts will perhaps reward the florists of those countries by sporting with them in return.

As an illustration of plants other than Chrysanthemums sporting simultaneously in different places, Mr. F. Elsom, of The Nurseries, Canterbury, Melbourne, wrote as follows* :—"I had sent me some seed of *Papaver nudicaule* in the three colours, imported from Tottenham, and was surprised to see at flowering time that 95 per cent. of the orange-scarlet had changed to yellow, being orange-scarlet only whilst in bud, opening generally a clear yellow, but now and again with orange streaks in them, so that I had to discard this colour altogether in selling them. The whites and yellows were very clear in colour, but very abnormal: about 20 per cent. were semi-double in character, and 5 per cent. as double as a Poppy Anemone. When the last named came single they were as large as the Shirley Poppies in many cases. Another batch, grown thirty miles away, by a nurseryman friend of mine, from Cannell's seed, came exactly similar, so that these changes were undoubtedly due entirely to climate."†

Similarly, I have been informed that Petunias "doubled" in England, France, and Germany simultaneously; and that Carnations will "run" in some summers in many places at once.

PROLIFEROUS SPORTS.—The "flower" of a Chrysanthemum is of course a "head" of flowers, every floret representing a distinct flower. Sometimes in lieu of each floret there is a miniature head, each containing several florets, and surrounded by its own involucre of green bracts. When these are in blossom the result is a considerable increase in size of the "flower"; and such sometimes form the large heads exhibited at shows. Another form is what is known as "Hen and Chickens" in the Daisy. Besides the usual head in the centre, a number of smaller ones on long pedicels spring out from below the former. This variety is fixed in the Daisy, and probably both the preceding could be made permanent in the Chrysanthemum if they be thought valuable acquisitions.

CAUSES OF SPORTING.—The colours of flowers are due to chemical substances, which are, in the main, undoubtedly organ-

* *Gardeners' Chronicle*, March 5, 1892, p. 312.

† The reader will compare these remarks with those of Mr. Hughes-Gibb quoted above, p. 539.

ised products—*i.e.* made by the plant itself. Nevertheless, as high or low nutrition, prolonged and clear sunlight, as well as temperatures, have marked influences upon the colours of flowers, if he cannot alter the sunlight, the florist has one means, at least, at his disposal—namely, the ingredients of the soil. As an example of marked atmospheric influences is the well-known fact of the greater brilliancy of flowers in high latitudes and altitudes. MM. Bonnier and Flahault have shown that this is indirectly due to the enhanced assimilative powers of the foliage in consequence of the prolonged sunlight, by means of which the flower-making and flower-colouring materials are increased. Oxidisation under the action of light has been thought to be another cause of change in colour, as in the case of the changeable Hibiscus, which is white in the morning, pink at noon, and bright red by sundown. Again, a species of Phlox with pink flowers is of a light blue colour at first at 5 A.M., but by 9 or 10 A.M. acquires its proper colour, the clump which catches the sun's rays first being the first to change, as is also the case with Chrysanthemums. Thus the variety already alluded to, called the Changeable Buff, introduced by Reeves in 1824, commences yellow, but passes into a pinky orange as the flower expands. Again, the magnificent Etoile de Lyon bears two kinds of flowers, the crown or single buds being nearly a pure white, while terminal buds are described as a lilac-rose. One cannot as yet assign any definite cause to account for these differences, but can only suggest that they may be due to some obscure differences in nutrition. Mr. Lowe describes Titania as a sport from the white Pompon Modèle. It has blooms which are white at first, and then become pink, with the centre of the bloom remaining white.* Again, Mr. Buss speaks of Lady Dorothy as being of a pretty tint of fawn flushed with pink. When grown for late flowering, and with all its flower buds left on, it comes more of a yellow colour than fawn, apparently indicating a tendency to reversion. I remarked that the colours of flowers are due to chemical substances organised by the plant itself; and Professor Sachs came to the conclusion that it is the ultra-violet rays of the solar spectrum which have some special power in making flower substances. We know very little about these particular rays in their relation to plant life; but judging from the fact

* *Gard. Chron.* Feb. 23, 1878, p. 242.

that flowers so often fail to be produced in even very moderate shade, coupled with the intensity of colours in high alpine flowers, which enjoy a clear, uninterrupted atmosphere, we can at once realise the importance of bright and prolonged sunlight. It must be remembered, however, that light itself has little to do with the actual making of the flowers. This depends entirely on the foliage; so that for fine flowers one must see that the foliage can do its work to perfection; especially that the surface of the leaf is not begrimed with soot, &c., but well cleansed, if necessary, with soap-and-water. Although we have no direct control over climatal conditions, we can do what we like with the soil. We can impoverish it or enrich it, or supply any special ingredients we choose. Such undoubtedly affect the colouring of flowers, and apparently the power of sporting as well. To give one or two examples:—Mr. Hovey said,* that striped Dahlias will be best kept clean by planting them in a poor soil, while a rich soil invariably runs them. I believe this treatment is well known to florists, and generally adopted for other plants as well. As another result of impoverishment, Mr. Lowe describes a number of sports of Chrysanthemum, as having been, as he surmises, actually caused by it.† “Two years ago I treated the plants badly; they were never potted off, and took care of themselves as best they could in an orchard; they never bloomed that year, and were all but killed. I cannot help thinking that this has been the cause of many of the sports.” A hint from Mr. Burbidge‡ corroborates Mr. Hovey’s remarks on Dahlias, when writing about the fixation of sports:—“It is advisable to grow cuttings of sports in such a way as to ensure the full development of all the flower-buds they form . . . and so prove them to the core, as sports often revert to the parent type. Now to do this it is advisable to grow them in a poor soil, without stopping . . . and to take care to give them no more pot-room than is needful for fair growth, but at the same time taking care not to starve them out of constitution.” I find a corroboration of this in Sharrock’s work, already referred to. He says:—“Seeing it is evident that variety of colours sometimes cometh from the weakness of the plant, some art

* “Magazine of Horticulture” (quoted in *Gard. Chron.* 1842, p. 8).

† *Gard. Chron.* Jan. 5, 1878, p. 18.

‡ “The Chrysanthemum,” p. 46.

may be used to alter the colours, not only of offsets and slips, but also of the flowers that arise from mother plants [*i.e.* sports]. . . . The expert gardener endeavours to recover sickly roots of choice flowers, and purposely he infects others with sickness . . . by taking up the roots a little before they come to flower, and laying them in the sun to abate their luxury, and to cause them to come better marked the year following" (p. 93). I quote these few cases of the effects of a poor soil to show that growers have found out by experience, if not by experiment, at least something towards the production and fixation of sports. On the other hand, nutrition enhances the intensity of colourisation. A friend told me that he watered white-flowered Balsams with a solution of ammonia; by this means the plants bore red flowers. Soot, which conveys much ammonia to the soil, is said to heighten the red colour of Apples. Chloride of lime has been found to cause a self-coloured Camellia to become striped, &c. Mr. Claydon also found that Weigela changed from white to rosy-pink, according to the nature of the soil.* These few facts are suggestive of experimentation, as the number of earths and salts, &c., which might be tried are innumerable. And since ingredients of the soil is the only one of all the circumstances which conspire to make up the plant's environment, which is really in the power of the grower, it is clear that it is in this direction that experiments should be made.

CHEMICAL CONSTITUENTS OF CHRYSANTHEMUMS.—The principal chemical constituents of the Chrysanthemum are said by Mr. George Truffaut to be in order of their importance:—1, lime; 2, phosphoric acid; 3, potash; 4, soda; 5, magnesia; 6, nitrogen; 7, silica; 8, sulphuric acid; 9, oxides of iron and manganese; 10, chlorine. In the flowers, nitrogen exists abundantly as well as phosphoric acid, magnesia, and potash; lime exists in the leaves, and large quantities of silica in the roots. The compost recommended by Mr. Truffaut in the *Journal de la Société Nationale d'Horticulture de France* as the outcome of his investigations consists of—"Leaf-mould, 1 part; mould from an old cucumber bed, 1 part; coarse sand, 1 part; loam, 1 part; wood-ashes, $\frac{1}{4}$ part. Over this is dusted a small proportion (1 per cent.) of phosphate of lime."†

* *Gard. Chron.* Dec. 6, 1890, p. 668.

† *Ibid.* May 2, 1896, p. 557.

DISSOCIATION OF PARENTAL CHARACTERS.—This peculiarity is not uncommon in plants, whether they be true hybrids, *i.e.* the offspring of distinct species, or the progeny of crossing varieties. The characters of the two parents become separated and borne by two distinct branches of the plant. The well-known *Cytisus Adami* appears to be a case in point. A hybrid Hellebore has been known to bear white flowers on one sport, and purple flowers on another, &c. Similarly, in *Chrysanthemums*, M. Carrière mentions how a variety called *Sophie* bore flowers which were flat, having the petals narrow and imbricated, as well as flowers which were rounded, the petals being large and but little compact. As another instance, that author remarks that the variety *Argentine*, which is a Pompon, gave rise to a more vigorous branch, which bore large flowers, like the ordinary large-flowered *Chrysanthemums*. This may therefore have been a case of dissociation, the form *Argentine* having probably been a descendant from a cross between some form of *C. indicum* and *C. sinense*. Again, the green *Vivian* Morel bore two flowers, one of which was pink in the lower half and pure green in the upper. The other flower was pure white with a green patch on one side of the flower. Many other instances are known, and are familiar objects to *Chrysanthemum* growers. This property, which might be described as the result from a storage of forms and colours, strikes one as not only very remarkable, but practically suggestive. It seems as if a plant, having been subjected to some new conditions, sports. The sport is propagated, and retains the character peculiar to the parent "in the blood," which enables it to revert. The sport itself sports again, and the latter now contains two forms in its constitution. It may sport again, and so on, perhaps any number of times, and yet probably retain all the preceding sports latent in its constitution. Now, as *Chrysanthemums* imported into this country have been grown from time immemorial in China and Japan, every variety may now be, for all we know, a sort of *multum in parvo*, and the oftener one alters the conditions of the environment of those which have proved themselves to be most sportive, such as the so-called "families" of Queen Victoria, Princess of Wales, Duchess of Teck, &c., so much the more likely, as it seems to me, will fresh sports be produced. Hence it would seem from



FIG. 117. — *CYPRIPEDIUM* × *DAUTHIERI* (*C. BARBATUM* ♀ × *C. VILLOSUM* ♂).
(*Gardeners' Chronicle*.)

a study of sports that the Chrysanthemum contains two means at its disposal. One is a force which causes the sport to reproduce an ancestral form which had existed before; a second when, by a new combination of its internal forces, it produces an entirely new and original colour or form altogether. We cannot tell to which class a sport may be referred unless we possessed every sport that ever existed for comparison. But that no new sport can arise without some alteration in the surroundings, as ingredients in the soil or climate, I think all evidence concerning plant life tends to show. I do not mean to imply that the sport need immediately follow some alteration; for if we regard the formation of flowers as the result of forces, we know that forces may accumulate, lie dormant, or remain potential till circumstances occur which, so to say, liberate them. So that a new feature may take generations, for all we know, before it can make itself apparent; or an old character may lie dormant for ages. Hence, to produce sports, the more varied the surroundings can be made, so, I believe, is the greater chance of sporting to be induced.

As a good illustration of "dissociation," the accompanying figure (117) represents this phenomenon in a hybrid *Cypripedium*. "The flower came from the collection of Sir F. Wigan at Sheen.* It is a form of *C. Dauthieri* \times , which is the result of a cross directly or indirectly of *C. barbatum* and *C. villosum*. The figure shows that one-half of the scape, bract, flower-segments, lip, and even the staminode partakes of the characters of *C. villosum*, whilst the other half shows the form and colouration of *C. barbatum*. Similar variations in *Calanthes*, *Chrysanthemums*,† *Roses*, and other plants have been figured."

I have said nothing about intercrossing—this is too obvious a means of introducing changes in the offspring—but it stands altogether outside the limits of our subject, for sports are, strictly speaking, limited to "bud variations," which appear on an individual during the course of its growth, and not in the seedling. Consequently I need only remind the reader of the two well-known laws of such propagation, viz. cross, for variation, and self-fertilise, for fixation.

Now let us examine the structure of the flower of the Chrys-

* *Gard. Chron.* Nov. 30, 1889, p. 632.

† *Ibid.* March 16, 1895, p. 335.

anthemum itself, and see how variations arise from it. Florists recognise several distinct forms. Starting from the original "single" or wild form we have the ray and the disk florets, like a Daisy. The first change is the so-called "doubling." In this the disk florets become very similar to the ray. Now follow the various details. If we examine a ray floret, we find it has a short tube, with a flattened limb of three petals only. If the tube is elongated, with little or no limb, the quilled form results. If the limb is enlarged, widened, and the tube is short, we get the recurved and the incurved forms, according as the flat piece bends outwards or inwards. If the limb is very narrow and long, the Japanese actiniform varieties result. Returning to the wild type we start afresh, and simply enlarge the disk florets. We thus get the Anemone form. If the ray becomes tubular like the disk, but enlarged, the number of the lobes to the corolla increasing, as in the Cornflower, the Dragon's-mouth variety is secured. If, however, we ask what causes all these differences to arise respectively, at present there is no reply, and therefore we do not know what steps to take to induce them to form respectively, until Nature herself has supplied the first indication of a change. The first thing to do, if we want to discover a cause, is to look out for coincidences. If a sport appear, I would ask the florist to note anything and everything he can observe as to the conditions surrounding that plant, and to find out its ancestry. It would seem desirable to note also the climatic conditions at the time, as sports of a like kind in plants, as we have seen, often appear simultaneously both in different places of the same county or counties, and also in different seasons.

It is only by accumulating coincidences that we can arrive at the first suspicion of a cause. When we think we may have discovered that a certain result seems to occur often or generally under certain particular circumstances, then is the time for experiments, to try and induce the same result to occur by artificially supplying those circumstances. Practical men are often inclined to look suspiciously on scientific men as being too theoretical; but the reply is, that if only practical men would observe more, and record their observations, and then hand them over to the scientist, each party would, without doubt, benefit very largely by the other. The scientist has no such grand opportunities as the practical man. Thousands of facts familiar

to the latter would be inestimable boons to the former, if only he could get at them. The practical man, unfortunately, does not always perceive their significance, but if every sport that has occurred on Chrysanthemums had been recorded, coupled with the whole history of the plant and description of its surroundings, the method and kind of soil used, &c., we should probably have known much more than we do now, as Dr. Masters suggests, who thus wrote:—"Whoever will investigate the cause of these sudden outbursts of local variation must, of course, sedulously examine each case for himself, according to the measure of his ability and of his opportunity. The circumstances, the history, the progress, the anatomy, of each particular sport must be investigated, both absolutely and in relation to similar outgrowths in other plants. Until this is done, and it has not been done yet, any explanation as to the cause of the phenomenon must be a matter of speculation."* The only way likely to lead to an interpretation of the origin of sports is by means of such careful observations as Dr. Masters here suggests and by experiments. Unfortunately, this is just the means which florists and practical cultivators of all sorts apparently have no time for carrying out. It requires great patience, and in the end any particular series of experiments may lead to no practical results. The experimenter must work in faith, and be in nowise disheartened if no result immediately follow.

Could these admirable recommendations be carried out, I might perhaps at this moment have been holding forth on "The Causes of Sports, and How to Produce them," instead of being compelled to expose my ignorance by saying that neither I nor any botanist, as far as I know, can yet fully expound the "why" and the "wherefore" of bud variation.

* "Bud Variations or Sports," *Gard. Chron.*, Jan. 10, 17, 24, Feb 21 1891.

NOTE ON FIG. 117—"DISSOCIATION."

"The question of the origin of these erratic productions—Sports—often arises. For our own part, we are convinced that one reason for their production may be found in the separation or unmixing of previously-combined characteristics. A cross, of whatever degree, is simply a combination of different characters and different modes of growth. Modern researches into the mode of growth of the nucleus of the cell show how the new plant results from the combination of the particles of one nucleus, the male, with the corresponding segments of another, or female, nucleus. (*See* pages 448, 449, 450.) And the combination of particles is not hap-hazard, but in definite numerical proportion. Now, if the combination should, by exception, be imperfect or unstable, the result would be the production of a 'Sport.'"

"It is simple enough—C is of mixed origin = $A + B$. For some at present occult reason, the mixture is not stable, and instead of C, we have A B *side by side*, as in Fig. 117, instead of in amalgamation. It supplies one way of accounting for some 'Sports.'"

M. T. M.

Fellows of the Society are requested to notice that the following twelve pages are printed separately as a leaflet, and that copies may be obtained for circulation at a nominal cost. Fellows are particularly requested to assist in the circulation of it.

VARIETIES OF FRUITS.

1898 EDITION.

THE

ROYAL HORTICULTURAL SOCIETY.

ESTABLISHED
A.D. 1804.



INCORPORATED
A.D. 1809.

Trial Garden :—Chiswick, near London.
Exhibition Hall :—Drill Hall, James Street, Westminster.
Head Office :—117 Victoria Street, Westminster.

Application being constantly made to the Society to recommend varieties of fruits, COTTAGERS, the owners of SMALL GARDENS, and FARMERS are advised to consult the following list before planting. No varieties have been included that are not considered to possess the four most necessary characteristics of Quality, Fertility, Good Growth, and Hardiness; and such short notes as appeared desirable have been attached.

W. WILKS,
Secretary.

NOTE.

(i) The Lists are arranged as far as possible in order of Ripening, not in order of Merit.

(ii) Before deciding which Variety to choose read the whole list through carefully with the notes.

(iii) The dates following the names indicate the season at which the particular Variety is usually ready for use; it may, of course, be earlier or later; it will certainly vary slightly with each varying year, and will be somewhat later in the North of England than in the South and West.

Copies of this Paper for distribution may be obtained at the Society's Head Office. Price, post-free, single copy, 1½d.; or per 25, 1s. 6d.; 50, 2s.; 100, 3s.

APPLES.

Compact Growers may be planted, as Bushes, 8 feet apart; as low Standards, 15 feet apart; or high Standards, 18 feet apart.

Medium Growers, as Bushes, 10 feet apart; as Standards, 24 feet.

Free and Strong Growers, as Bushes, 12 feet; as Standards, 30 feet.

Bush trees may, if desired, be planted twice as thickly as advised above, and in three years half of them can be carefully taken up and replanted elsewhere to extend the Fruit garden.

Soot, and wood or bonfire ashes, spread over the surface with a little lime form an excellent manure for Apples—indeed, for all fruit trees.

APPLES FOR COOKING.

I.—VARIETIES SUITABLE FOR GARDENS, AS BUSHES OR AS HALF-STANDARDS.

1. **White Transparent.** *August.* Compact grower; healthy and productive. It is also an excellent eating Apple for those who like a brisk, sub-acid fruit.
2. **Lord Grosvenor.** *September.* Strong sturdy grower.
3. **Potts' Seedling.** *September.* Compact grower. Succeeds well in towns.
4. **Frogmore Prolific.** *October.* Medium grower, rather pendulous.
5. **Stirling Castle.** *October.* Compact grower; pendulous.
6. **Seaton House.** *October and November.* Compact grower.
7. **Golden Spire.** *November.* Compact upright grower.
8. **New Hawthornden.** *November.* Medium spreading grower.
9. **Small's Admirable.** *November and December.* Compact grower; pendulous.
10. **Hormead Pearmain.** *November to January.* Medium grower.
11. **Bismarck.** *December and January.* Medium grower.
12. **Bramley's Seedling.** *December to March.* Strong grower.
N.B.—For a bush it *must* be on Paradise stock.
13. **Lane's Prince Albert.** *January and February.* Compact pendulous grower. Best as a Half-Standard.
14. **Newton Wonder.** *February and March.* Free grower. Keeps well. A grand Apple.

II.—SUITABLE FOR STANDARDS AND ORCHARD TREES.

1. **Duchess of Oldenburg.** *August.* Free upright grower. Will not keep long.
2. **Ecklinville.** *September.* Free grower,

3. **Grenadier.** *September.* Compact grower. Free bearer.
4. **Warner's King.** *November.* Strong grower.
5. **Lord Derby.** *November.* Medium upright grower. Better in the South of England than in the North.
6. **New Northern Greening.** *December.* Free grower. A favourite in the Midlands and North.
7. **Alfriston.** *January to March.* Free grower. Also good as a Bush on Paradise stock.
8. **Bramley's Seedling.** See above. A very good Apple to graft on feeble trees of inferior varieties.
9. **Newton Wonder.** See above.
10. **Dumelow's Seedling** (syns. Wellington and Normanton Wonder). *February to April.* Medium grower. Productive, but prone to canker.

APPLES FOR EATING.

I.—VARIETIES SUITABLE FOR GARDENS, AS BUSHES OR HALF-STANDARDS.

1. **Mr. Gladstone.** *August.* Compact grower. Very short keeper.
2. { **Irish Peach.** *Late August.* Medium grower. Bears on the tips.
Or
Lady Sudeley. *August and September.* Medium grower. A very handsome fruit.
3. **Devonshire Quarrenden.** *August and September.* Medium grower. Good on Paradise stock.
4. **Worcester Pearmain.** *September.* Free upright grower. A good Market Apple, because of its colour.
5. **King of the Pippins.** *October and November.* Compact grower. Likes a warm, strong soil.
6. **Cox's Orange.** *October to January.* Medium grower. The finest English eating Apple.
7. { **Scarlet Nonpareil.** *December and January.* Medium grower.
Or
Cockle's Pippin. *January to March.* Free grower.
8. { **Braddick's Nonpareil.** *January to March.* Compact grower.
Or
Court Pendu Plat. *February and March.* Compact grower.

NOTE.—Ribston Pippin is not mentioned, because the tree is so prone to canker. Many growers would prefer Margil, which has a Ribston flavour, to King of the Pippins for their October Apple.

II.—SUITABLE FOR STANDARDS AND ORCHARD TREES.

1. **Devonshire Quarrenden.** See above.
2. **Worcester Pearmain.** See above.

3. **Cox's Pomona.** *October and November.* Compact grower. Also good for cooking.
4. **King of the Pippins.** See above.
5. **Cox's Orange.** See above.
6. **Blenheim Orange.** *November to January.* Strong grower. An excellent Apple; also cooking fairly well; but slow in coming into bearing.
7. **Gascoyne's Scarlet.** *December and January.* Strong grower. It may also be used earlier in the year for cooking.

Almost all Eating Apples cook fairly well before they are quite ripe.

PEARS.

Pears may be planted at distances advised for Apples of *medium* growth; they prefer strong soil.

PEARS FOR EATING.

I.—VARIETIES SUITABLE FOR BUSHES.

1. **Williams's Bon Chrétien.** *September.* Medium grower. Will not keep long.
2. **Louise Bonne of Jersey.** *October.* Compact grower. Excellent flavour; very juicy.
3. **Marie Louise d'Uccle.** *October.* Compact grower. Wonderfully fertile. Fair flavour.
4. **Beurré Hardy.** *October and November.* Strong grower. Excellent flavour and quality; very sweet.
5. **Pitmaston Duchess.** *October and November.* The largest of all. Very strong grower. Fair flavour. Very good stewed.
6. **Comte de Lamy.** *October.* Free grower. Small, but very fertile, and of delicious flavour.
7. **Durondeau.** *October and November.* Medium grower. Very juicy; brisk sub-acid flavour.
8. **Doyenné du Comice.** *October and November.* See Wall Pears. May be grown as a bush in warm situations.
9. **Émile d'Heyst.** *November.* Strong grower. Very juicy and of excellent quality and flavour. A very fine pear, and a good bearer.
10. **Josephine de Malines.** *January.* Free grower. May be grown as a bush in the South, elsewhere on walls.

NOTE.—As a rule Pears are not very profitable for cottagers and small farmers to grow, but if they are required the above are very good. Fertility is a very free-bearing September market Pear of medium growth.

II.—VARIETIES SUITABLE FOR WALLS OR FENCES.

1. **Louise Bonne of Jersey.** See above.
2. **Beurré Superfin.** *October.* Small grower. Very juicy and of fine flavour and quality.
3. **Durondeau.** *October and November.* See above.
4. **Doyenné du Comice.** *October and November.* Medium grower. Of marvellous quality, sweetness, and flavour. The finest of Pears.
5. **Émile d'Heyst.** *November.* See above.
6. **Maréchal de Cour.** *November.* Free grower. Good quality.
7. **Winter Nelis.** *December.* Small grower. Very juicy and sweet.
8. **Nouvelle Fulvie.** *December and January.* Medium grower. Rough in shape, but of very fine flavour and quality for so late a pear.
9. **Josephine de Malines.** *January.* See above.
10. **Marie Benoist.** *January and February.* Medium grower.

Jargonelle and Marie Louise succeed on north walls in Southern and Midland counties.

III.—VARIETIES SUITABLE FOR STANDARDS.

1. **Jargonelle.** *August.* Strong grower. Does not keep.
2. **Williams's Bon Chrétien.** *September.* See above.
3. **Beurré d'Amanlis.** *September and October.* Free grower. Fair flavour.
4. **Doyenné Boussoch.** *October.* Free grower. Very handsome, but decays quickly.
5. **Pitmaston Duchess.** *October and November.* See above.
6. **Émile d'Heyst.** *November.* See above.

 PEARS FOR COOKING.

1. **Beurré Clairgeau.** *November.* Very strong grower. Often fit for dessert.
2. **Catillac.** *January and February.* Free grower. Bush or Standard. Should be allowed to hang on the tree late.
3. **Verulam.** *February and March.* Very strong grower, the tree attaining a great size as a Standard.

PLUMS.

Plums may be planted at distances advised for Apples of *medium* growth.

Lime is particularly good for Plums.

All the Plums are recommended as Standards unless otherwise noted.

PLUMS FOR EATING.

1. **Belgian Purple.** *Late August.* Compact grower. Dark purplish red; a great bearer; also cooks well.
2. **Rivers's Early Transparent.** *Early September.* Strong but close grower. Green; the finest early Dessert Plum; succeeds as a bush or on Wall or Fence. This must not be confused with "Transparent" or with "Late Transparent," which are distinct varieties.
3. **Jefferson.** *September.* Compact grower. Greenish yellow; a large and fine Plum.
4. **Bryanston Gage.** *Mid-September.* Medium grower. Green; fine flavour; better on Bush or Wall, but succeeds as a Standard in warm soils.
5. **Coe's Golden Drop.** *Late September.* Slender grower. Yellow, will hang for a long time after ripe and improve in richness of flavour, but, save in very exceptional positions, must have a wall.

PLUMS FOR COOKING.

1. **Rivers's Early Prolific.** *Early August.* Spreading, drooping tree. Purple; the most valuable early Plum; of superb flavour when cooked. Best as a Half-Standard.
2. **Rivers's Czar.** *Mid-August.* Strong, upright grower. Dark purple-red; a good bearer.
3. **Victoria.** *Late August.* Medium grower of spreading habit. Pink; an enormous bearer; the best for general purposes, but has little flavour.
4. **Cox's Emperor.** *Early September.* A strong grower. Large dark red; of the Orleans type.
5. **Pond's Seedling.** *Mid-September.* Strong, compact grower. Large; red; a good bearer.
6. **Rivers's Monarch.** *End of September.* Robust grower. Black; very large; the best late Plum.

DAMSONS.

1. **Bradley's King.** *September.* A strong grower and free bearer. Medium size; oval; excellent flavour.
2. **Crittenden's** (syns. Cluster, Farleigh Prolific). *Mid-September.* Medium grower. Small, hardy, very prolific.
3. **The Prune Damson.** *Late September.* Free grower; large leaves and oval fruit. It is sometimes called the "Shropshire" and the "Cheshire" Damson.

NOTE.—Damsons as Standards might far oftener be planted in hedge-rows, with considerable profit, than is now the case.

CHERRIES.

Cherries should be planted at distances advised for Apples of *free* growth.

All those mentioned are suitable for Standards.

CHERRIES FOR EATING.

1. **Early Rivers.** *Very Early.* Free pendulous grower. Black. A magnificent Cherry in every respect.
2. **May Duke.** *Early.* Free grower; red fruit; upright habit.
3. **Elton.** *Early.* Medium grower. Yellow, red cheek.
4. **Black Eagle.** *Mid-Season.* Strong grower. Black. Hardy. Fine flavour.
5. **Kent Bigarreau or Amber Heart.** *Mid-Season.* Free grower. Yellow, red cheek. Forms a large tree.
6. **Bigarreau Napoléon.** *Late.* Free grower. Yellow, red cheek. Hardy. Very fine.

CHERRIES FOR COOKING.

1. **Kentish.** *Mid-Season.* Strong grower. Bright red; very juicy; of the finest flavour. The Flemish Cherry is almost as good, but is a little later. Kentish has a *very* short stalk; Flemish a long one.
2. **Morello.** *Late.* Slender grower. Deep red. Very useful for training on North walls, where few fruits do well. The true Morello should be planted. For Half-Standards the Wye Morello succeeds better in most districts; it has much smaller fruit than the true Morello, but is equally rich in flavour.

RASPBERRIES.

1. **Norwich Wonder.**

2. **Superlative.**

Both are excellent red raspberries.

CURRANTS.

1. **Red Dutch.** Early Red.

2. **Raby Castle.** Late Red.

3. **White Dutch.** White.

4. **Baldwin's or Carter's Champion.** Black. Great Bearer.

5. **Lee's Prolific.** Black.

GOOSEBERRIES.

1. **Crown Bob.** G.D.

2. **Broom Girl.** D.

3. **Dan's Mistake.** G.

4. **Early Sulphur.** D.

5. **Keepsake.** G.

6. **Lancashire Lad.** G.

7. **Leader.** D.

8. **Red Champagne.** D.

9. **Warrington.** D.

10. **Whitesmith.** D.

11. **Whinham's Industry.** G.

12. **Snowdrop.** D.

NOTE.—All Gooseberries may be used green for cooking, and it is well to thin the Dessert varieties for this purpose. Those which are best suited for cooking, either green or ripe, are marked with a G; those of best flavour when ripe, with a D.

STRAWBERRIES

1. **Royal Sovereign.**

2. **Vicomtesse Héricart de Thury.**

3. **Sir Joseph Paxton.**

4. **Newton Seedling.**

5. **Elton Pine.**

NOTE.—All are dependable Strawberries, ripening in the order named. No. 1 is the finest early Strawberry. No. 2 is a large cropper, the smaller fruits retaining their shape when preserved. No. 3 is the great maincrop market variety. No. 4 is a great bearer; fruits firm with brisk flavour; excellent for preserving and for travelling. No. 5 is late and serviceable,

NOTES ON PLANTING FRUIT.

The best months for planting bushes and trees are the end of October, November, February, and the first half of March. Just digging a hole, cramming the roots in, shovelling the soil over, stamping it down, and leaving it, is **the wrong way to Plant**, and can only result in failure.

The right way is:—

(i) Open a hole at least 1 foot broader than the roots cover. Throw out the top spit, then well break up the bottom to the full depth of a fork or spade, replace some of the finer soil in a mound in the centre, and set the tree upon it.

(ii) If the roots are in any way jagged or torn, cut the ends cleanly off with a sharp knife from the under side, and shorten back all downward roots.

(iii) Place the tree in position at such a depth that when the planting is finished it will be at the same depth as it was in the nursery, which will be seen by the soil mark on the stem. The depth should be such that the upper roots will be about 3 or 4 inches below the surface when finished.

(iv) The roots will generally be found to be growing from several parts of the stem. Spread out the lowest roots carefully on the soil, and scatter a little fine earth over them; then spread out the roots next above these, adding more soil; then those above them, and so on, giving a small shake now and then to let the soil run in between the fine roots.

(v) When all the roots are spread out and covered, add a little more soil and tread it firmly (not hard), and fill up slightly above the surrounding soil, as it will sink one or two inches.

(vi) Put a strong stake to the tree, and be sure the two are fastened together in such a way as to make it impossible for the stem of the tree to chafe itself against the stake when the winds blow.

(vii) Protect the trees from rabbits, cattle, and sheep.

It is impossible to exaggerate the importance of all the above details of planting.

If the natural soil is very poor, a little better garden soil may be brought for (iv), shaking it amongst the roots, just to give the tree a good start; but no dung whatever should be placed in contact with them, but a thin layer over the surface when the planting is done will be helpful.

It is very important not to plant too deep (iii), especially in wet or heavy land. In very wet land it is best to plant the trees almost on the surface, and to mound the earth up over the roots.

It is very important to spread out *all* the roots down to the smallest fibres (iv), and none should be allowed to take a directly downward direction, but every one ought to be duly spread out, slanting very slightly downwards from the point at which they grow out of the stem.

It is very important that the soil should not be left loose about the stem and roots (v), but firm treading does not mean hard ramming.

It is very important to fill up the hole 2 or 3 inches above the general ground level (v), and not leave a hollow for water to collect in and become stagnant.

It is very important to stake trees (vi) firmly, so that the roots are not strained by the wind; but better not stake at all than so as to let the stake chafe through the bark.

It is better to lay the tree in, just lightly covering the roots up with soil, for a time, than to plant when the ground is in a wet, sticky condition or during frosty weather.

No turf should be laid over the roots of newly-planted trees, but keep the ground clean from weeds, and lightly stir it at intervals for two years all over the surface one or two inches deep, to admit sun and air.

The purchase of trees at markets and auctions cannot be recommended. They may or may not be true to name, but their roots are almost unavoidably considerably dried.

Strawberries.—Strawberries should be planted in August or very early in September. In planting, the collar or neck must be only just below the ground; and the roots should be well spread out on all sides.

Raspberries.—When planting, spread out the roots; shorten back the canes in spring to a height of 6 or 9 inches, or to 3 or 4 buds. You must not expect fruit the first season, but this treatment will ensure fine fruiting canes for the next year.

NOTE ON PRUNING.

Apples, Pears, Plums, Damsons, and Cherries.—In order to promote strong growth Standard Apples, Pears, and Plums should have their shoots shortened at planting to about one-third of their length, and should not be allowed to bear fruit for 2 years. Damsons require little pruning, as the buds on the lower part of the shoots break into growth naturally. Cherries are best left unpruned the first season, and the less they are cut the better at all times. Young Bush trees should be treated in the same way as standards, but older ones which have been several years trained in a nursery will not need much pruning. After the first year's growth has been made from the cut back shoots, Standards will only need the removal in summer of shoots that cross or crowd one another. Bush trees should have the side shoots on the branches shortened to about 6 good leaves in July, cutting further back to 2 or 3 buds when the leaves fall, and the leading shoots pruned to 10 or 12 buds.

Strawberries.—When not wanted for planting, cut off the "runners" as they appear, so as to throw all the strength into the main crowns. Do not cut the leaves off. Fresh beds should be made every 3rd year. It is a good plan to plant one or two fresh rows every year, and destroy one or two old ones.

Raspberries.—Thin out the young growths in early summer by *pulling up* the superfluous ones, and cut out the old canes altogether as soon as they have done fruiting. Manure should be laid over the roots and left to decay. Raspberries are injured by digging amongst the fibrous roots near the canes.

Currants and Gooseberries.—Red and White Currants should have the young side shoots shortened to 5 or 6 leaves early in summer, cutting back to a couple of buds in winter, and shortening the main

leading shoots then to 6 inches, more or less, according as it is wished to let the bush increase in size or not. The centre of the bushes should be kept quite free from growths. Black Currants should be pruned on the exactly opposite plan, cutting out the old wood and leaving the young summer growths their full length, only removing shoots in the centre, so that the leaves of those remaining do not touch one another. Red and White Currants bear chiefly on the old wood; Black Currants on the new (*i.e.* last year's) growth. Gooseberries bear both on the spurs and young wood; therefore in pruning leave a young shoot here and there where room can be found or made by cutting out old enfeebled parts; but always remember that the pruning should be so done that the hand can be passed through all parts of the bush without touching the thorns.

NOTE ON MANURING, &c.

It is a mistake to give young trees heavy dressings of manure, as the ordinary soil of gardens is rich enough. For the first few years aim at laying the foundation of a good tree; keep the boughs rather thin, *i.e.* well apart, not crowded, in order that the leaves may be fully exposed to sun and air, so as to ripen the wood, and thus form a sturdy basis for future good crops. Some varieties will bear the second year, and may then be assisted by manure laid on the surface after the fruit is well set, or by waterings of liquid manure, or soapy water, &c., in summer, but fruit trees, young or old, if they are growing and healthy, should only have manure applied when they are bearing a crop, so as to enable them to bring the year's fruit to perfection, and at the same time form fresh blossom buds for next year. When trees make only 3 to 6 inches of extension growth they need generous support; if 6 to 12 inches, give moderate assistance; if 12 to 18 inches, give no manure. If a tree makes very gross growth with few or no fruit buds do not cut back all the gross shoots severely, but thin them well out in summer, and in autumn dig well down and shorten the strong roots by root-pruning. It is a bad thing to dig amongst fruit trees with a spade, as it injures the small fibrous roots which ought to be encouraged to increase near the surface. These small surface (essentially fruit producing) roots are greatly injured, either by digging or by extreme dryness of soil. Spreading a covering of farmyard manure over the surface as far as the roots extend, on the first approach of hot weather, cannot be too highly advised; but heavy coatings of dung during March, April, and most of May are injurious, as they exclude the sun's warmth, which is then so much needed to promote healthy root action.

ARTIFICIAL MANURE.

All fruit trees and bushes needing support will be benefited by an application of 4 ozs. of Basic Slag and 1 oz. of Kainit per square yard, as far as the roots extend, in the autumn; followed by 2 ozs. of Superphosphate and .1 oz. of Sulphate of Ammonia in February or March. There will then be conveyed to the soil Lime, Phosphates, Potash, Nitrogen, Magnesia, and a little Iron. In chalky soils or dry "hot" land, Nitrate of Soda may be used instead of Sulphate of Ammonia, but a little later, or when the blossom buds are expanding, another dressing may follow if trees are heavily set with fruit. These dressings may be increased somewhat or diminished according to the condition of the trees. It is of small use applying the two first named minerals—Basic Slag and Kainit—late in the spring, as they are then not dissolved in time for appropriation by the roots during the current season.

ADDENDA.

Amateurs, who would like to have some of the more promising of the newer or less known fruits than those before mentioned, are advised to try the following:—

APPLES FOR EATING.

- American Mother.** *October.* Of very fine flavour.
- James Greive.** *October.* A fine flavoured hardy Apple, with very tender flesh.
- St. Edmund's Pippin.** *October and November.* A large and very fine Russett.
- Allington Pippin.** *November and December.* Very similar to Cox's Orange, but of sturdier growth.
- Lord Hindlip.** *January to March.* Excellent flavour. Large.
- D'Arcy Spice.** *March.* Small, but of splendid flavour.

PEARS FOR EATING.

- The Parrot Pear.** *September and October.* A very beautiful roundish fruit, and of delicious flavour.
- Marguerite Marillat.** *October.* Very large.
- Thompson's.** *October.* Of superb flavour.
- Belle Julie.** *October and November.* Medium grower. A small but delicious and free bearing pear.
- Beurré Fouqueray.** *October and November.* Free bearer. Very juicy.
- Beurré d'Anjou.** *November.* Of fine flavour and quality.
- Fondante de Thirriot.** *November.* Wonderful bearer.
- Beurré Dumont.** *November.* Of fine flavour and quality.
- President Barabé.** *December.* A very promising new pear of fine flavour.
- Duchesse de Bordeaux.** *January and February.* Compact grower.
- Le Lectier.** *January and February.* Large and of good flavour.

Pears may be tested very quickly by growing them for a season or two in pots (fig. 118), in which form they very rapidly come into bearing.

STRAWBERRIES.

- Veitch's Perfection.** Not at all a large fruit, but of excellent flavour.
- Countess.** Magnificent perfume and flavour.
- Auguste Boisselot.** Large round soft berries with brisk flavour, which melt away in the mouth.
- Leader.** } Very large berries.
- Monarch.** }



FIG. 118.—PEAR TREE GROWN AS A POT PLANT. (*Gardeners' Magazine.*)

AFFILIATED SOCIETIES.



FIG. 119.

A wish having been expressed by some of the societies which are affiliated to the Royal Horticultural Society that they may be allowed to use the Society's Badge, fig. 119, the Council desiring to meet this very legitimate wish for some outward symbol of affiliation, but considering it better that the Badge should not be actually identical with that in ordinary use by the Parent Society, have caused a new Badge, fig. 120, to be struck, which may be used by Affiliated Societies, on letter paper, schedules, &c., as they may think fit.

A printing block of this Badge will be presented to every Affiliated Society (now numbering over 100) on application to the Secretary, and on signing an undertaking to return the same if the affiliation should for any reason be ended.

UNDERTAKING TO BE SIGNED BY THE SECRETARY OF AN AFFILIATED SOCIETY APPLYING FOR THE BADGE.

On behalf of the _____ Society, affiliated to the Royal Horticultural Society, I request that you will be kind enough to forward a printing block of the Affiliated Societies' Badge, for the use of our Society, and I hereby undertake to return the same should our affiliation be for any reason ended.

Signed

Secretary of the

Society.



FIG. 120.

To the Secretary, R.H.S. OFFICE,
117 VICTORIA STREET, WESTMINSTER,

VICTORIA MEDAL OF HONOUR.

The account of the institution of this medal was given on pages 1 to 5 of the present volume.

On October 26, 1897, the President and Council invited all the sixty recipients of the medal to luncheon at the Hotel Windsor, Victoria Street, Westminster, and the great majority of them were able to be present. Sir Trevor Lawrence, Bart., President of the Society, was in the chair, and all the other members of Council were present.

After luncheon the President gave the toast of "The Queen, the Patron of our Society," which was heartily responded to.

The President then proceeded to explain the object of the gathering. He said there was a strong desire early in the present year on the part of the Royal Horticultural Society to do something to celebrate the long reign of Her Majesty. The Queen had for many years been the patron of the Society, and many members of the Royal Family were Fellows; while they would also recollect that the late Prince Consort was for some years their President. For the greater part of a century the Society had presided over and in a great measure directed the gardening interests of this country, and he thought they would agree with him that the Queen being patron of the Society, it was only becoming that the Society should celebrate the remarkable occasion of Her Majesty's sixty years' reign. If he were to enter into the subject of the great advances made in horticulture, and in all branches of gardening during that period, it would take up too much of their time, and, besides, those subjects had been dealt with recently by persons far abler than he was to deal with them. He would only say that those people must be blind indeed who could not see the enormous strides which gardening had made in this country during the last fifty or sixty years. He ventured to think that the great strides that had been made illustrated the fact—as a fact it undoubtedly was—that gardening was by no means one of the pleasures of the rich only. He remembered when he had the honour of representing in Parliament rather a poor part of London—Battersea and Wandsworth—being struck by the great care and trouble which the people took with their window boxes, and he was sure that as great an

interest was taken in gardening by the poorer people as by the rich and wealthy. Perhaps it would be an exaggeration to say that gardening was the mother of all the virtues; but at the same time he thought they might say, with perfect truth, that there were very few pursuits and occupations with so small an admixture of evil. When the question arose as to what the Royal Horticultural Society was to do to celebrate the Diamond Jubilee, he need scarcely say that the fertile brain of their Secretary had a suggestion to make. He did not mean to say that the Secretary's brain was the only brain that was fertile, but the fertility of his brain produced a more sturdy plant than the fertility of other brains. He might say that it was due to the inspiration of the Secretary that they took into consideration the proposal of the establishment of the Victoria Medal of Horticulture. Many projects were considered and looked at all round, but it became perfectly clear that the Secretary's suggestion was by far the best of them all that came before them, and he, as President of the Society, was instructed to ask Her Majesty's gracious permission to establish the Medal. They were all aware that Her Majesty scrupulously abstained from taking any prominent share in choosing the method of celebrating her Jubilee; but the Queen graciously intimated to the Society her assent to their proposal, and expressed her opinion that there could be no possible objection to it. That being so, they decided on carrying out the suggestion of the Secretary, and he, personally, was very glad they did. He was glad to see one of their lady members present that day, and they would all feel that nothing could be more becoming when they were celebrating the Jubilee of Her Gracious Majesty than that some members of her own sex should be medallists. He did not think anything could show more conclusively than that gathering that the Council did wisely in adopting the suggestion of their Secretary. He saw around him men of the greatest eminence, and he thanked them for their presence that day. When the question arose as to who were to be the recipients of the medals, it was thought right that every department connected with the art and science of gardening should be represented. Every possible care was taken in the selection, and if certain names appeared on the list and others did not it would be understood that there were good reasons both for the inclusion and the exclusion. In the

first place it would not have been at all becoming if the Council, who had the selection of the names, should have distributed the medals among its own members. Then there were reasons—official reasons, private reasons—why certain gentlemen, who were invited to become recipients, thought it their duty to decline. The result was that the recipients of the medal included eight botanists—he took them first, as science beyond all things was the moving power of the world at the present time. At the head of them they had the distinguished botanist who sat on his right (Sir Joseph Hooker), a man who during a long life had done more valuable work in the science of botany than any other man had ever achieved. Then they had six collectors and hybridisers. They had, representing the gardening trade, fourteen nurserymen and men engaged in business. They had two members who represented the market aspect of gardening; and they had twenty-seven medallists representing practical gardeners, fifteen of whom were amateurs and twelve professional. Then they had one landscape gardener who, with two members of the horticultural press, made up the sixty. He could assure them that the greatest possible trouble was taken in the selection in every case. No doubt the Council had made mistakes in including names which some might think ought to have been omitted, and in leaving out names that others would think ought to have been included; but they had done their best to secure a thoroughly representative list of names. He would here like to say that the Queen having sanctioned the establishment of the medal, it would be very distasteful if it were used for purposes of advertising. In conclusion, the President expressed his gratitude to all those who had attended the gathering, and explained that the design for the medal was the work of a lady—Miss Margaret Giles—who had carried out a very graceful conception in a most satisfactory way.

Sir Joseph Hooker, in responding for botanists, said:—"Mr. President and Gentlemen of the Council,—I feel that you have done me a very great honour in selecting me first amongst the recipients of the Victoria Medal of Honour to respond to your kind and welcome toast. I cannot, however, accept this primacy without embarrassment when I consider how little claim I have to horticultural honours compared with so many other recipients, including some who represent the second and even third genera-

tions of single firms which have by their energy and enterprise throughout the greater part of the century contributed to the adornment of the gardens alike of prince and peasant throughout the globe. I may, however, be allowed to accept it as a representative of Kew, and in token of the recognition on the part of the Royal Horticultural Society of the services of that establishment towards the advancement of its aims. The objects of Kew are manifold, but primarily botanical and economic. They are the introduction of new and rare plants for scientific purposes, their classification, identification, description, and illustration by the exhibition of living specimens to the public, and their delineations in published works, and, what is of far more importance, it labours for the diffusion of plants useful to mankind in the arts, manufactures, and in medicine, to all parts of the world, and especially to India and our colonial possessions. But how is this to be accomplished without practical horticulture, without which Kew would be limited to a herbarium, museum, and library, and its gardens would be a waste? Turning again to the scientific aspect of horticulture, how, without its aid, is the life history of plants to be written? Ask Darwin, the pages of whose botanical works teem with grateful acknowledgments of the aid he obtained from nurserymen and gardeners in the pursuance of his far-reaching researches in the growth and functions of seeds, leaves, flowers, and fruits. It is physiological botany that profits most by the art of the horticulturist, for without this art that great branch of the tree of knowledge would be but a stunted limb. Botany and horticulture must, then, go hand in hand if either is to prosper and progress. It now only remains for me, on the part of the Botanist recipients of the Victoria Medal of Honour, to return to the Council of the Royal Horticultural Society their cordial thanks for this honour thus conferred upon them, coupled with their deep sense of Her Majesty's most gracious act in conferring her name upon the symbol, and approving of its award.

Dean HOLE, who responded on behalf of Amateur gardeners, remarked that, although only one lady was present, no other could have represented the fair sex so appropriately, so royally, at this Jubilee meeting, because they all acknowledged Miss Jekyll as the "Queen of Spades." He went on to say that in associating his name on that occasion with such a company they

had greatly added to the enjoyment of a day which he should always regard as one of the brightest of a long and happy life : so long, indeed, that he thought he could claim the title which was coveted in the great University of Cambridge, next to that of Senior Wrangler, and style himself Senior Medallist ; and so happy because it had been spent largely in scenes which they all loved most, and with men like themselves, whose tastes and habits were in such complete accord with his own. If there was such a thing as righteous pride, and if it was justifiable to put on a little "side," he though they had a right to wear it that day, and he was not sure that they should not be permitted to assume the demeanour of that gentleman whom Theodore Hook saw swaggering along one day and interrogated, "Sir, are you anybody in particular?" For himself, he had been for some days in training and preparation for this supreme event. On Thursday it was his privilege to entertain her Royal Highness Princess Christian at the Deanery, and on Saturday it was his privilege to attend the Prince of Wales as Grand Chaplain ; and now to-day he had the distinguished privilege of paying honour to two Queens—the Queen of Flowers—the Rose—whom gardeners loved, and the Queen of England, whom all England revered. But it was not pride which was uppermost in their thoughts that day. On the contrary, it was a very humble thankfulness that they had been permitted to enjoy the purest of human pleasures, and that they had been allowed to transmit to others the method and fruition of their success. It was impossible for an old man—in a retrospect of the years that had gone—not to have sweet solace in the thought that he had been permitted in some degree to help in brightening the lives of others by means of a healthful and harmless occupation among things pleasant to the eye, and good for food. The Society of which Sir Trevor Lawrence was President—the right man in the right place—with its Council of experts and its unwearying Secretary, had done excellent work for a long time past in many places by promoting the science of horticulture ; and although, of course, he was prejudiced on the present occasion, he ventured to say that the institution of the Victoria Medal would prove a grand encouragement in quickening the ambition and energies of those men who would excel hereafter in botanical science and in horticultural skill.

Mr. SHERWOOD, who responded on behalf of medallists belonging to the horticultural Trades, said that after the excellent speeches to which they had listened with such pleasure they would forgive him for being brief. He would not dwell upon the marked improvement in the seed and nursery trade that had taken place during the last sixty years, as quite recently Mr. Bunyard, Mr. Sutton, and Mr. Assbee had written exhaustive papers on the subject. He would only say that the Royal Horticultural Society would be heartily thanked for all it had done ; a work which would be recognised by all the gentlemen who had been brought together that day. None of them would easily forget the bestowal of the Jubilee Medals. He was glad the President referred to the Council in this connection, because there were many who thought that the members of the Council should certainly have received some recognition. He could only hope that some such recognition would follow in due course.

Mr. HUDSON (gardener to Mr. Leopold de Rothschild) responded for the Gardener medallists. He said they ought to congratulate themselves that they steered clear of the controversies as to celebrating the Queen's Diamond Jubilee which they saw going on in other professions. He had been identified with the Royal Horticultural Society for close upon thirty years, and he had always endeavoured to carry out three principles—to serve his employer to the best of his ability, to further the work they had at heart, and to assist those of the craft who needed assistance. He was confident that in the establishment of this medal the Council had taken a most wise decision, and one which would redound to their credit and popularity amongst all the gardening craft.

Baron SCHRÖDER then rose and said that he had been asked to propose the "Health of the President and the Council of the Royal Horticultural Society," and he considered it a great honour, among so many distinguished gentlemen, to have been selected for that duty. He felt that he could hardly do justice to the toast, as he was no speaker ; but he thought that, as an old and retired member of the Council, he had had a great deal of experience of the troubles and anxieties connected with the office of President of that great Society. He therefore felt that all honour was due to those gentlemen for the way in which they had brought the Society to its present splendid position. He

well remembered when he was called to the Council. At that time they were located at South Kensington, where they had a large and lofty conservatory, but a wretched Council Chamber. He also remembered that at that time the Council was very much divided. Some were for continuing in the old groove, and seeing the old Society gradually die out; but there were others—and at their head was Sir Trevor Lawrence—who believed they would be doing right in breaking away from the old traditions. That was a grave step to take. They had many consultations together. They had no money, they had hardly any friends, and the Society was going from bad to worse; still, they had a President, and that President helped them. In the midst of their troubles, and when they were considering whether they should leave South Kensington or not, they were turned out. That was the darkest hour for their Society. They could not pay their rent, they had no home in London, and very few friends, but their President stuck to them. He was ready for the occasion, and under his wise and careful management the Society had gradually prospered, and it was now in a position which no other horticultural Society in the world could boast of. Now they were at the Drill Hall and at 117 Victoria Street. They were wise to go there because they had nowhere else to go. He still held his old opinion that the Society ought to have a home of its own, and he hoped that some day such would be the case. He heartily congratulated the President and officers, and he felt sure that under their guidance the Society would continue to flourish.

The PRESIDENT, in response, said that Baron Schröder had referred to him in far too flattering terms. He well remembered the days about which the Baron had spoken, and he was bound to say that it was owing, in a large measure, to the Baron's hearty support that they were enabled to carry out the change of policy to which reference had been made. It was the duty of the Royal Horticultural Society to stick to horticulture, and from the moment the Council gave evidence of a determination to follow that course it had not looked back. It was impossible for him, in responding to the toast, to give adequate utterance to the feeling of gratitude entertained by members of the Council towards the amateur and professional gardeners of the country for their support on all occasions, evidence of which was

given by the splendid collection of plants brought together in the Drill Hall that day. The President then quoted the following statement from the *Journal* of the Society:—"The Royal Horticultural Society has spent during the ninety-two years of its existence no less than £400,000. That it has made mistakes and wasted money its best friends will not deny; but it may confidently be asserted that it has done and is doing a good work which no other Society could do—a good work of value to the community—and the introductions of the Society and the lessons it has taught have embellished the land and smile on the visitor from every park and garden in the kingdom." He thought that fairly represented the work of the Society, which, he believed, had the cordial support of the horticulturists of this kingdom.

DISTRIBUTION OF THE MEDALS.

The company then adjourned to the Drill Hall, where a large number of persons had assembled to witness the interesting ceremony of presenting the medals. The President, having made a few opening remarks, called upon the Secretary, the Rev. W. Wilks, to read out the names of the recipients, each recipient stepping forward to receive his medal from the President's hands as his name was called out.

Baker, John Gilbert, F.R.S., F.L.S., Royal Herbarium, Kew.

Balfour, Prof. Isaac Bayley, M.A., Sc.D., M.D., C.M., F.R.S., F.L.S., &c.,
Royal Botanic Gardens, Edinburgh.

*Barr, Peter, King Street, Covent Garden.

Barron, Archibald F., Sutton Court Road, Chiswick.

Beale, Edward John, F.L.S., Stoneydeep House, Teddington Grove.

Boxall, W., 186, Brook Road, Upper Clapton, N.E.

Bull, William, F.L.S., King's Road, Chelsea.

Bunyard, George, Royal Nurseries, Maidstone.

Burbidge, Frederick William, M.A., F.L.S., Trinity College Bot. Gardens,
Dublin.

Crump, William, Madresfield Court Gardens, Malvern.

Dean, Richard, Ranelagh Road, Ealing.

Dickson, George, Chester.

D'Ombraïn, Rev. H. H., Westwell Vicarage, Ashford, Kent.

Druery, Charles T., F.L.S., 11 Shaw Road, Acton, W.

*Dunn, Malcolm, Palace Gardens, Dalkeith.

*Ellacombe, Rev. Canon, Bitton Vicarage, Bristol.

Elwes, H. J., F.R.S., Colesborne, Andoversford, Glos.

- *Foster, Prof. Michael, M.A., M.D., LL.D., F.R.S., Cambridge.
- *Fraser, John, South Woodford.
 Gordon, George, Endesleigh, Priory Park, Kew.
 Heal, John, 10 Musgrove Crescent, Fulham, S.W.
 Henslow, Rev. Prof. George, M.A., F.L.S., &c., Drayton House, Ealing.
- *Herbst, H., Stanmore, Kew Road, Richmond.
 Hole, The Very Rev. S. Reynolds, Dean of Rochester.
 Hooker, Sir Joseph Dalton, M.D., K.C.S.I., G.C.S.I., F.R.S., Sunningdale, Berks.
 Horner, Rev. F.D., Kirkby-in-Lonsdale.
 Hudson, James, Gunnersbury House Gardens, Acton, W.
 Jekyll, Miss Gertrude, Munsted Wood, Godalming.
 Kay, Peter, Claigmar, Finchley, N.
 Laing, John, Forest Hill, S.E.
- *McIndoe, James, Hutton Hall Gardens, Guisborough.
- *Maries, Charles, F.L.S., The Residency, Gwalior, Morar, India.
 Milner, Henry Ernest, F.L.S., Dulwich Wood, Norwood, S.E.
 Molyneux, Edwin, Swanmore Park Gardens, Bishop Waltham.
 Monro, George, Covent Garden.
 Moore, Fred. W., A.L.S., Royal Botanic Gardens, Glasnevin.
 Morris, Dr. Daniel, M.A., C.M.G., D.Sc., F.L.S., Royal Gardens, Kew.
 Nicholson, George, A.L.S., Royal Gardens, Kew.
 O'Brien, James, Harrow-on-the-Hill.
 Paul, George, The Old Nurseries, Cheshunt.
- *Paul, William, F.L.S., Waltham Cross.
 Rivers, T. Francis, Sawbridgeworth.
- *Rothschild, Hon. Walter, 148 Piccadilly, W.
- *Sander, Frederick, St. Albans.
 Schröder, Baron Sir Henry, The Dell, Staines.
 Seden, John, Middle Green, Langley.
 Sherwood, N. N., Dunedin, Streatham Hill, S.W.
 Smith, James, Mentmore Gardens, Leighton Buzzard.
 Smith, Martin R., Hayes Common, Beckenham.
 Speed, H., Penrhyn Castle Gardens.
 Sutton, Arthur W., F.L.S., Reading.
 Thomas, Owen, Royal Gardens, Windsor.
- *Thompson, William, Ipswich.
- *Thomson, David, Drumlanrig, N.B.
 Turner, H., Slough.
- *Willmott, Miss Ellen, Warley Place, Great Warley, Essex.
 Wilson George F., F.R.S., F.L.S., &c., Heatherbank, Weybridge Heath.
- *Wolley-Dod, Rev. C. Edge Hall, Malpas, Cheshire.
 Wright, John, Rose Hill Road, Wandsworth.
 Wythes, George, Syon House Gardens, Brentford.

THE MEDAL.

The medal itself was designed by Miss Giles and executed under her immediate supervision by Mr. Pinches. It is of fine gold.

The obverse, fig. 121, represents Flora in a kneeling attitude drawing a flower towards her, and inhaling its perfume. Over her head are the letters V.R.I. (*Victoria Regina Imperatrix*); below are the letters R.H.S. (the Society's initials); and on either side the dates 1837 and 1897. The reverse, fig. 122, is a reproduction of the Society's badge of a tree, displayed; a band across the centre bears the words VICTORIA MEDAL, and



FIG. 121.



FIG. 122.

round the edge, the superscription ROYAL HORTICULTURAL SOCIETY. It is considered a very fine work of art, recalling some of the best examples of ancient Greek designs. The woodcuts, figs. 121 and 122, do but very scant justice to this beautiful medal, but they are reproduced from a photograph, and it is somewhat difficult to get a good photograph of a gold medal.

MINUTES OF COUNCIL RELATING TO THE VICTORIA MEDAL.

November 23, 1897.—To avoid misunderstanding in the future the Council desires the following note to be sent to all

Victoria Medallists who are in any way connected with horticultural businesses, viz. :

“In awarding the Victoria Medal of Honour the Council unanimously laid it down as a rule, from which no departure was under any circumstances permissible, that the distinction was not to be used in any way whatever for purposes of trade or of advertising.

“The feeling of the Council was that a purely honorary *personal* distinction, to the establishment of which Her Majesty's gracious consent had been given, would be degraded by any such use.”

December 11, 1897.—The following resolution was passed by the Council and directed to be made public, viz. :

“In the event of any recipient of the Victoria Medal violating the conditions on which it was bestowed by using it in future for advertising or for the promotion of trade interests in any other way, the name of such offender shall be struck off the list.”

January 11, 1898.—The Council having been consulted as to a proper mode of the use of the Victoria Medal by members of horticultural trades have decided that the only permissible method is by affixing the letters V.M.H. to the name of the holder of the medal. No other mention of the medal can be properly made in any publication pertaining to an horticultural trade or relating thereto.

REPORT ON TOMATOS AT CHISWICK, 1897.

Thirteen new varieties of Tomatos were sent to the Gardens for trial. These were all grown, for comparison, with well-known and valuable sorts already in cultivation, the result being that the new varieties were not considered by the Committee to be any improvement on the older ones. They were all sown on March 10, and examined by the Committee on September 8.

The following older varieties of proved merit were grown—viz. The Conference, Ham Green Favourite, Perfection, Young's Eclipse, Sutton's A 1, Comet, Duke of York, Blenheim Orange, and Chiswick Dessert.

The new varieties were as follows :—

1. Aubergine Tomato (Handyside).—This was supposed to be a cross between the Aubergine and Tomato, but no sign of the Aubergine cross having taken could be discovered. Growth loose, poor crop, fruit purple, corrugated ; large and very coarse.

2. Dwarf King (Lansdell).—Growth compact, poor crop, fruit red, corrugated ; large and of fair flavour.

3. Dwarf Queen (Lansdell).—Growth compact, good crop, fruit bright red ; medium size, smooth, heavy, and of good flavour.

4. Fincham's No. 1 (Fincham).—Growth compact, heavy crop, fruit purple ; large, corrugated, and of poor flavour.

5. Harrowgate Beauty (Dale).—Growth compact, moderate crop, fruit red ; medium size, smooth, firm, and of good flavour.

6. King of the Yellows (Cutbush).—Growth fairly compact, moderate crop, fruit beautiful golden yellow ; medium size, smooth, and of good flavour.

7. Majestic (White).—Growth compact, heavy crop, fruit red, corrugated ; large and of inferior quality.

8. New Tree Tomato (Goody).—Growth very compact, poor crop, fruit medium size ; smooth, red, and fair flavour.

9. Red Drop (Lee).—Very similar in every point to Royal Sovereign.

10. Royal Sovereign (Corbett).—Growth compact, heavy crop, fruit red, handsome ; large, smooth, and of very good flavour.

11. The Cropper (Cutbush).—Growth compact, good crop, fruit red, medium size; smooth and very good flavour.

12. The Lorillard (Watson).—Growth compact, moderate crop, fruit red; large, slightly corrugated, and of good flavour.

13. The Queen (Gibson).—Growth compact, heavy crop, fruit red, medium to large; smooth and of excellent flavour.

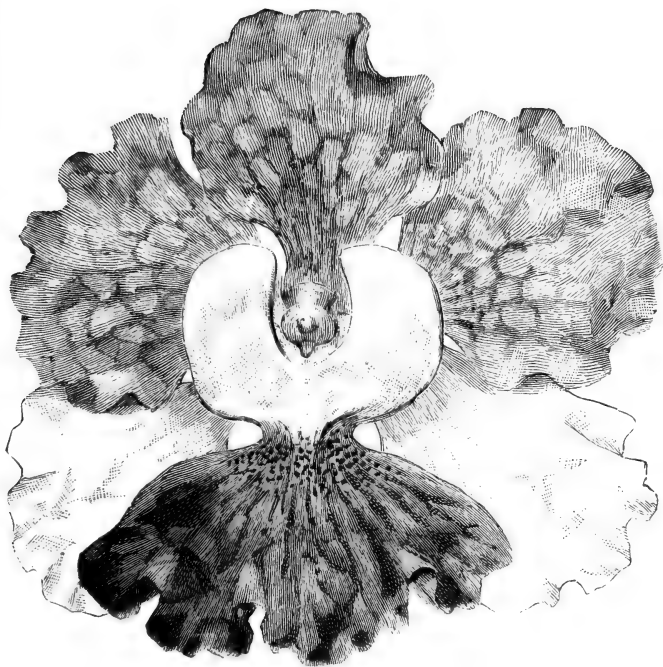


FIG. 123.—VANDA × 'MISS JOAQUIM' (V. TERES × V. HOOKERIANA). (*Journal of Horticulture*.) This plant flowered for the first time in Europe in the spring of 1897, in the President's garden at Burford. In size, and in the form of the sepals and petals, and also in the rose-colouring with orange disc to the lip, the flowers followed V. teres, but the other parent, V. Hookeriana, was well shown in the openly displayed side-lobes and broad front-lobe of the lip. See p. clxviii.

BOOKS PRESENTED TO THE SOCIETY'S LIBRARY.

- "A Book about Roses," by the Very Rev. S. Reynolds Hole, Dean of Rochester, presented by the proprietors of the *Gardeners' Chronicle*.
Agricultural Gazette of New South Wales.
- Alphabetical Catalogue of Plants growing in the open-air at Marchese Thomas Hanbury's garden at La Mortola, Italy, presented by Marchese Hanbury.
- Bulletin de la Société d'Horticulture de Genève, 1897.
- Bulletins of the Botanical Department, Jamaica.
- Bulletin of the Botanical Department, Jamaica, 1897.
- "Carnation Manual," Second Edition, presented by the National Carnation and Picotee Society.
- Catalogue of the Library of the Linnean Society of London.
- Eight Vols. of the Transactions of the R.H.S., 1805-1835, presented by Mr. D. Hill, Watford.
- "Enchiridion Botanicum," by [A. Broughton], presented by Mr. Edward Plater.
- "Ferns of New Zealand," by H. C. Field, C.E., presented by Mr. Oscar Martinson.
- "Flora Batavia."
- "Flora Capensis," vol. vi. pt. 3, and vii. pt. 1, presented by the Director of the Royal Gardens, Kew.
- "Flora of British India," general index.
- "Forest Flora of South Australia," Nos. 1, 2, 8, and 9 (from *Gardeners' Chronicle*).
- "Fruit Culture for Amateurs," by Mr. S. T. Wright, presented by the Author.
- "Fruit-growing as an Auxiliary to Agriculture," by Cecil H. Hooper, and presented by him to the Library.
- "Gartenflora," 1897.
- "Hand-list of Tender Monocotyledons," by the Director, Royal Gardens, Kew.
- "Icones Plantarum," by Sir J. D. Hooker, G.C.S.I., presented by the Bentham Trustees.
- Journal de la Société Nationale d'Horticulture de France, 1897.
- Journal of the Linnean Society.
- "Kew Bulletin," presented by the Director, Royal Gardens, Kew.
- "Le Jardin du Crest," by Marc Micheli, presented by the Author.
- "L'Orchidoplile," by F. Du Buysson, presented by Mrs. Enoch Harvey.
- "Manual of Practical Orchard Work at the Cape," by P. Macowan and E. Pillans, presented by Mr. P. MacOwan.
- Missouri Botanical Garden Report.
- "Orchid Review," 1897.
- Proceedings of the American Academy of Arts and Sciences, 1896.
- "Revisio Specierum Generis Cratægi," by J. Lange, and presented by him.
- "The Effect of Well-kept Grass-land," by Professor W. H. Brewer, presented by Mr. W. North Row.
- "The Flower Growers' Guide," vol. i., by John Wright, presented by the Author.
- "The Fruit Manual," Fifth Edition, by Dr. Hogg, presented by Mr. John Wright, V.M.H., in memory of the Author.
- "Tijdschrift voor Tuinbouw."
- Transactions of the English Aborigicultural Society.
- Transactions of the Royal Society of Canada.
- "Wiener Illustrirte Garten-Zeitung," 1897.

**DONORS OF PLANTS, SEEDS, &c., TO THE SOCIETY'S GARDENS
AT CHISWICK DURING THE YEAR 1897.**

- ALLSOP, J., Dalton Hall Gardens, Hull. Seeds of Brussels Sprouts.
 ANDREW, J., South Lodge, Brechin Castle. Seed Potatos.
 ASHELFORD, E. J., Brighton Road, Jersey. Seed Potatos.
 BAKER, R. T., Technological Museum, Sydney. Flower Seeds.
 BANNISTER, W., Cote House, Westbury-on-Trym. Pear-tree Scions.
 BARR & SONS, Messrs., King Street, Covent Garden. Early-flowering
 Chrysanthemums, Vegetable Seeds, &c.
 BEDDOME, Colonel, West Hill, Putney. Seedling Orange Plants.
 BELL, W., Annesley, Notts. Culinary Peas.
 BENNETT-POE, J. T., 29 Ashley Place, S.W. Greenhouse and Bedding
 Plants.
 BONAVIA, Dr., 31 Harrington Road, South Kensington. Seeds of Marrow
 Aubergines.
 BRETON, Miss, Forest End, Sandhurst. Seed of *Eucryphia pinnatifolia*.
 BROOKS, W. Weston-super-Mare. Zonal Pelargoniums.
 BRUMFIELD, J. B., Heckington. Seed Potatos.
 BURT, F. W., Caenwood Towers, Highgate. Crotons and Dieffenbachias.
 BUTCHER, A., Welling, Kent. Seed Potatos.
 CALLISON, R. D., Town Hall, Manchester. Cwt. of Manchester Corporation
 Concentrated Manure.
 CANNELL & SONS, Messrs., Swanley. Pelargoniums and early-flowering
 Chrysanthemums.
 CARMICHAEL, W., Pitt Street, Edinburgh. Strawberry Plants.
 CARTER & Co., Messrs. J., High Holborn. Vegetable and Flower Seeds.
 COOPER, TABER & Co., Messrs., Southwark Street, London. Vegetable
 Seeds.
 CORBETT, J., Mulgrave Castle Gardens, Whitby. Tomato Seed.
 COURTAULD, S., Bocking Place, Braintree. Greenhouse Plants.
 CRANE, D. B., Archway Road, N. Violas.
 CROOK, J., Forde Abbey, Chard. Onion Seed.
 CROSS, T., Bury St. Edmunds. Celery Seed.
 CROWLEY, P., Waddon House, Croydon. *Dracænas*, *Dieffenbachias*, &c.
 CUTHBERTSON, M., Rothesay. Hardy Plants, Vegetable and Flower Seeds.
 DAMMANN & Co., Messrs., Italy. Cannas, &c.
 DANIELS BROS., Messrs., Norwich. Seeds of Lettuce Continuity.
 DIBBENS, F., 22 Jewry Street, Winchester. Seed Potatos.
 DICKSONS, Messrs., Chester. Vegetable Seeds.
 DIVERS, W. H., Belvoir Castle Gardens, Grantham. Early-flowering Chrys-
 anthemums.
 DOBBIE & Co., Messrs., Rothesay. Early-flowering Chrysanthemums,
 Vegetable and Flower Seeds.
 DOUGLAS, J., Great Bookham. Seed of Fancy *Polyanthus*.
 ECKFORD, H., Wem. Culinary and Sweet Peas.
 EDINBURGH BOTANIC GARDEN. Collection of Seeds.
 ELLIOT, Dr., Sutton Court Road, Chiswick. Eight loads of Manure.
 FARR, W., Spring Grove Gardens, Isleworth. Variegated Strawberry Plant.
 FIDLER & SONS, Messrs., Reading. Seed Potatos, &c.
 FLETCHER, H., Annesley, Notts. Seed Potatos.
 FORBES, J., Hawick. Phloxes, Pentstemons, Flower Seeds, &c.
 FRASER, P. N., Rockville, Murrayfield. Eleven Plants.
 GIBSON & SONS, Messrs. R., Sunderland. Carnations.
 GODFREY, W. J., Exmouth. Chrysanthemums.
 GOODY, J., Clare, Suffolk. Begonias, Chrysanthemums, Tomato Seed, &c.
 GREEN, R. W., Cornhill, Wisbech. Onion Seed.

- HANBURY, T., La Mortola, Ventimiglia. Collection of Flower Seeds.
- HARRISON & SONS, MESSRS., Leicester. Vegetable Seeds.
- HAYWOOD, T. B., Woodhatch Lodge, Reigate. Cuttings of *Chrysanthemums* and one bag of Sulphate of Ammonia.
- HEATON, S., Newport, Isle of Wight. Culinary Peas.
- HEINEMANN, F. C., Erfurt. Vegetable and Flower Seeds.
- HERBERT, Hon. Mrs., Llanover, Abergavenny. Vine Cuttings.
- HENDERSON & Co., MESSRS., New York. Seed Potatos.
- HERRIN, C., Dropmore Gardens, Maidenhead. *Dracenas*, &c.
- HOLFORD, Captain, Weston Birt, Tetbury. *Pelargoniums*.
- HORSFORD, F. H., Charlotte, Vermont, U.S.A. Seed Potatos.
- HUDSON, J., Gunnersbury House Gardens, Acton. *Dracenas*, *Salvias*, Strawberry Plants, &c.
- HURST & Co., MESSRS., Houndsditch. Vegetable Seeds.
- INNES, W., City Mills, Derby. Chemical Manure.
- JONES, H. J., Lewisham. Early-flowering *Chrysanthemums*.
- KENT & BRYDON, MESSRS., Darlington. Vegetable and Flower Seeds.
- KING, Sir George, Sibpur, Calcutta. Seeds of *Ficus altissima* and *Cæs-alpinia minax burmanica*.
- LAING & SONS, MESSRS. J., Forest Hill. Apple Tree.
- LANSDELL, J., Barkby Hall Gardens, Leicester. Tomato Seed.
- LAWRENCE, Sir Trevor, Burford, Dorking. Plants and Flower Seeds.
- LAXTON BROS., MESSRS., Bedford. Culinary Peas.
- LEE & SONS, MESSRS. C., Isleworth. Tomato Seed.
- LLEWELYN, Sir J. T. D., Penllergaer, Swansea. Forty varieties of *Primulas*.
- LONG, J., Wisbech. Vegetable Seeds.
- LOW & Co., MESSRS., Upper Clapton. *Amaryllis*, &c.
- LYNCH, R. J., Botanic Garden, Cambridge. Collection of Flower Seeds.
- MCDUGALL BROS., MESSRS., 10 Mark Lane, E.C. Insecticide Fumers.
- MARSHALL, W., Auchinraith, Bexley. *Hypericum Moserianum* and twenty varieties of *Pelargoniums*.
- MASTERS, Dr., 41 Wellington Street, Strand. Seeds of *Aristolochia elegans*, &c.
- MORGAN, J. H., Priory Park Road, Kew. Seeds of Alpine *Auriculas*.
- NICHOLS, MESSRS. C. A. & H., 21 Mincing Lane, E.C. Bag of Humus *Précipité Nitratogène*.
- NUTTING & SONS, MESSRS., 106 Southwark Street, London. Vegetable Seeds.
- OLIVIER, J., Eslington Park Gardens, Whittingham. Seeds of Beet.
- PALMER, W., Andover. Onion and Potato Seed.
- PATENT SILICATE MANURE CO., Hemel Hempstead, Herts. Bag of Silicate Manure.
- PEARSONS & SONS, MESSRS., Chilwell, Nottingham. Fruit Trees and Zonal *Pelargoniums*.
- PFITZER, W., Stuttgart. Cannas.
- PLATER, E., 8 Luxembourg Gardens, Brook Green, W. Dozen plants of *Spirea bullata*.
- POWER, M. K. M., Aston Court, Ross. Pear Tree.
- POTTEN, W., Cranbrook. Zonal *Pelargoniums*.
- PROWSE, J., Hall Barn, Beaconsfield, Bucks. Cabbage Seed.
- RAPLEY, W., Harrow Weald. *Calceolarias*.
- READ, J., Bretby Park, Burton-on-Trent. Seeds of Read's Sprouting Broccoli.
- ROLFE, J. J., Stamford-le-Hope, Essex. Tomato Seed.
- ROYAL Gardens, Kew. Collection of Seeds of Trees, Shrubs, and Herbaceous Plants.
- SANDER & Co., MESSRS. F., St. Albans. Seeds of a new Bean from New Guinea.

- SANDERS, Lionel, Alexandria, Egypt. Seeds of *Ockrosia bourbonica*.
 SHARP, F. W., Waltham, St. Lawrence, Twyford. Seeds of a new Runner Bean.
 SHERMAN, Woodbridge, Suffolk. Onion Seed.
 SIM, W., Gourdas, Fyvie. Culinary Peas, &c.
 SOUTHALL, H., The Craig, Ross. Ten packets of Seeds.
 STAPLES, H., Spondon Old Hall, Derby. Iris Plants.
 SURREY SEED Co., Redhill. Carnations, &c.
 SUTTON & SONS, MESSRS., Reading. Seed Potatos.
 THOMAS, O., Royal Gardens, Windsor. Vine Cuttings.
 THORNE, F., Sunningdale Park, Berks. Begonia Gloire de Lorraine.
 TURNER, C., Slough. Vegetable Seeds.
 VEITCH & SON, MESSRS. R., Exeter. Culinary Peas.
 VEITCH & SONS, MESSRS. J., Chelsea. Fruit Trees, Cannas, Vegetable and Flower Seeds, &c.
 VERT, J., Audley End, Saffron Walden. Seed Potatos.
 VILMORIN, ANDRIEUX & Co., MESSRS., Paris. Cannas, Vegetable and Flower Seeds, &c.
 WAITE, F., 4 Wide Bargate, Boston. Seed Potatos.
 WARD, A., Stoke Edith, Hereford. Stove and Greenhouse Plants.
 WATKINS & SIMPSON, MESSRS., Essex Street, Strand. Vegetable and Flower Seeds.
 WEIR, W., Acton Park, Wrexham. Culinary Peas.
 WELLS, W., Earlswood, Redhill. Early-flowering Chrysanthemums.
 WHITE, J. H., Broad Street, Worcester. Tomato Plants.
 WILES, E. S., Downe, Farnborough. Seeds of a new Runner Bean.
 WILKS, Rev. W., Shirley Vicarage, Croydon. Crinums and Flower Seeds.
 WILSON, J., Commercial Street, Hereford. Chrysanthemums.
 WRIGHT, J., Rose Hill Road, Wandsworth. Seed Potatos.
 WYTHES, G., Syon Gardens, Brentford. Seed Potatos, &c.
 YATES, G. & W., MESSRS., High Street, Cheltenham. Vegetable and Flower Seeds.

[NOTE.—The Society would at all times be very glad to receive donations of old *Dracæna* stems of any varieties. They cannot be too old or too long. They should be sent to the SUPERINTENDENT, R.H.S. Gardens, Chiswick, London, W.]

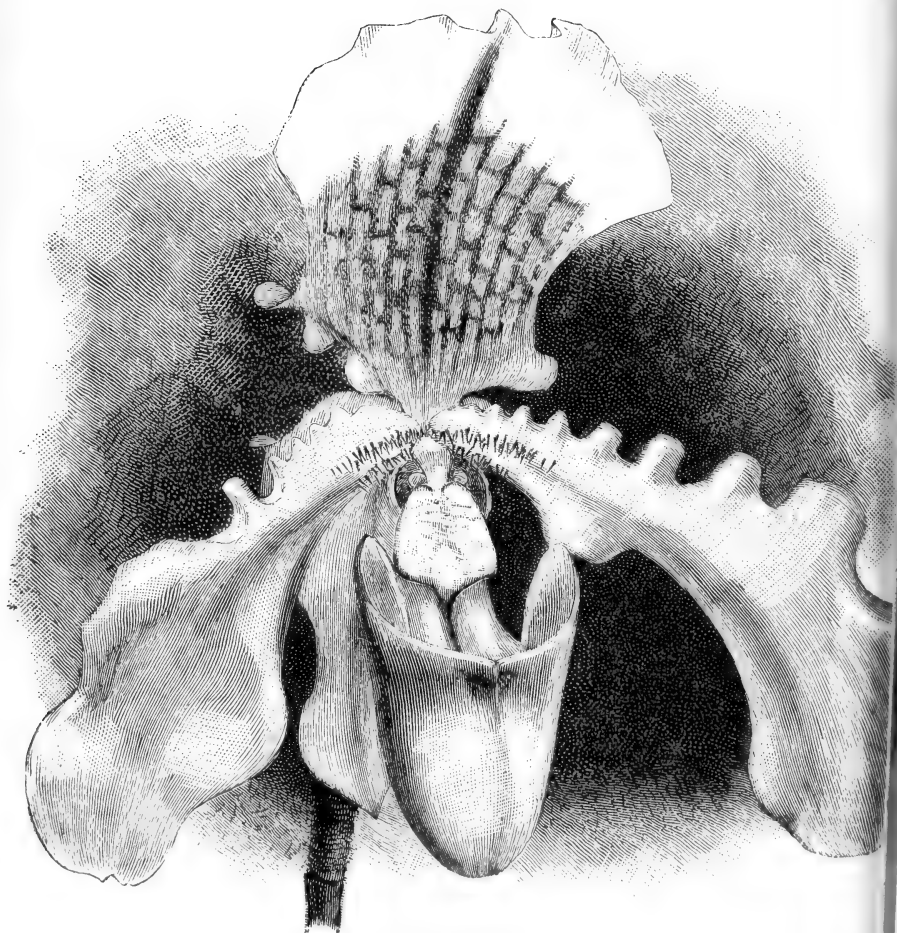


FIG. 124. — *CYPRIPEDIUM* × *HIRSUTO-SALLIERI* (*C. hirsutissimum* × *C. SALLIERI* HYBANUM). (*Journal of Horticulture*.) Flower, pale greenish or whitish-yellow with pale rose-lilac tips to the petals. See p. lxxxiii.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

JANUARY 12, 1897.

Mr. WILLIAM WATSON in the Chair.

Fellows elected (30).—Samuel Arnott, J.P., Claude Barker, L. R. Barker, F. W. Brewer, Miss Busk, D. R. Carter, Mrs. Cundey, Mrs. E. T. Dixon, Mrs. Alex. Findlater, H. Rider Haggard, Rev. Rowland B. Hill, Abraham Agar Hutty, Edmund H. Jenkins, John Long, H. Stanley Mobbs, John Mogford (Cape Town), George Norrish, Arthur W. Paul, Arnold H. Poole, Manley Powers, Arthur Rhodes, Miss Sharpe, Frederick Tapper, Mrs. Theakston, George Thompson, Mrs. Tufnell Tyrell, T. W. Webley, R. J. White, Jeffery Whitehead, Miss Amy Yates.

Society Affiliated (1).—Leicester Abbey Park Flower Show Society.

ANNUAL GENERAL MEETING.

FEBRUARY 9, 1897.

Sir TREVOR LAWRENCE, Bart. (President of the Society), in the Chair.

The Minutes of the last Annual General Meeting, held on February 11, 1896, were read and signed.

The following elections took place :—

W. H. Askew, Alfred Austin, Arthur Baker, Alfred Barker,

A. Bateman, Duke of Bedford, Arthur Boulton, A. E. Brooke-Hunt, Rev. G. R. Browne, Mrs. F. Caddy, Charles Clark, Wilson Crewdson, W. H. Davis, Seymour Deadman, R. W. Green, Sir R. Gresley, Frank Herring, George Hodgson, E. D. Hoyland, W. S. Iles, C. E. Keyser, L. E. Lambourn, H. Langston, F. Lee, Sir A. Moncrieff, Mrs. Nisbet, A. W. P. Pike, Miss Fanny A. Piril, H. Pitt, C. B. Powell, Walter Price, F. Randolph-Symmons, E. J. Sanger, E. C. Sharpin, H. W. Simmons, H. Staples, David Tod, Arthur Veitch, Sir Edmund Verney, J. C. Waltham, C. E. West, Mrs. H. S. Witham.

Associates (4).—D. R. Carter, W. H. Morter, Z. Novik, and W. Peters.

Messrs. Harry Turner and Joseph Cheal were appointed Scrutineers of the ballot.

A hearty vote of thanks, proposed by Mr. OWEN THOMAS, and seconded by Mr. H. TURNER, was accorded to the retiring members of the Council, viz.:—Sir Alexander J. Arbuthnot, K.C.S.I., George Bunyard, Esq., and H. J. Pearson, Esq.

To fill the vacancies thus caused, the following gentlemen were proposed, viz.:—Norman C. Cookson, Esq., William Marshall, Esq., and H. J. Veitch, Esq.

The Scrutineers declared these gentlemen to be duly elected members of the Council.

The PRESIDENT, in moving the adoption of the Report and Balance-sheet, which had been circulated among the Fellows of the Society in January, referred to the new entrance which had been erected at Chiswick Gardens during the past year, and also to the new houses which had superseded the two oldest structures in the Gardens.

He pointed out that it was just ten years since the Society had moved from South Kensington, and there was no reason whatever to regret the change considering the present sound financial position of the Society and the definite horticultural work which had since been accomplished.

Attention was called to the new departure of sending deputations to some of the large provincial shows, and the President regarded it as a sign of the cordial relations existing between the Society and horticulturists throughout the kingdom.

Special mention was made of the donors of fruit trees to Chiswick in the preceding autumn, and reference was also made

to the fact that the portraits of orchids receiving a First Class Certificate or Award of Merit would in future be painted.

In celebration of the Diamond Jubilee of Her Gracious Majesty, Queen Victoria, the President called attention to the paragraph in the Report in connection with the Victoria Medal of Horticulture, which it was proposed to have struck.

In concluding his remarks the President referred to the services of the various Committees to whom the best thanks of the Society were due, and made complimentary references to the officers of the Society.

Professor MICHAEL FOSTER, F.R.S., seconded the adoption of the Report (printed below) which, on being put to the meeting, was carried unanimously.

REPORT OF THE COUNCIL FOR THE YEAR 1896-97.

THE Council are glad to be able to report the conclusion of a full and satisfactory year's work.

Financially, the balance in hand is not as large as it was last year, but this is more than accounted for by the extraordinary expenditure which the Council felt able to undertake at Chiswick, the whole of which has been defrayed out of income. The conservatory at the entrance to the gardens, which had for so many years required repair, has been entirely removed, and replaced by a building in every respect worthy of the Society; and the two old greenhouses, Nos. 1 and 2, which had been an eyesore to the gardens by reason of their ruinous condition for almost a generation, have been remodelled and rebuilt. The total of this extraordinary expenditure is over £500.

Under the head of Ordinary Expenditure at Chiswick, £1,870 has been spent on the general work and repairs, and keeping up of the Gardens. Amongst other work, House No. 17 has been practically rebuilt, Nos. 15 and 6 have been very thoroughly repaired; the young men's bothies have also been put in good order, and made more comfortable. The receipts by sale of surplus produce amount to £844, making the net ordinary cost of the Gardens £1,526.

The Council have every reason to congratulate themselves and the Society upon the selection which they made to fill the office of Garden Superintendent.

At Westminster, nineteen Fruit and Floral Meetings have been held in the Drill Hall, James Street, Victoria Street, and six Committee Meetings have been held at Chiswick, besides the larger Shows in the Temple Gardens on May 19, 20, and 21; and at the Crystal Palace on October 1, 2, and 3. Lectures have been delivered at fifteen of the Meetings, exclusive of those given at the Crystal Palace. The number of awards granted by the Council, on the recommendation of the various Committees, has been as follows :—

Award	At provincial shows	On the Recommendation of the					Total
		Scientific committee	Fruit committee	Floral committee	Orchid committee	Narcissus committee	
Gold Medal	1	—	1	3	1	—	6
Silver-gilt Flora	5	—	—	17	1	1	24
Silver-gilt Knightian	2	—	9	—	—	—	11
Silver-gilt Banksian	1	—	1	10	1	—	13
Silver Flora	13	—	—	68	34	—	115
Silver Knightian	2	—	16	—	—	—	18
Silver Banksian	8	—	22	78	43	1	152
Bronze Flora	—	—	—	7	—	—	7
Bronze Knightian	—	—	4	—	—	—	4
Bronze Banksian	—	—	5	26	5	—	36
First Class Certificate	4	—	8	36	36	—	84
Award of Merit	17	—	23	210	100	2	352
Botanical Certificate	1	1	—	2	47	—	51
Cultural Commendation	8	—	13	6	35	—	62
Highly Commended	10	—	—	—	—	—	10
Commended	3	—	—	—	—	—	3
Total	75	1	102	463	303	4	948

The Council must again express their opinion that there still appears to be a tendency to multiply unduly the awards recommended, and they earnestly request the several Committees to consider seriously whether there is not a real danger of impairing the value of these distinctions by such increase of their number; and whether it would not be possible, as well as politic, to be somewhat less generous in the recommendation of awards

during the ensuing year. This is a question which the Council cannot but regard with solicitude, and they hope that every Member of the Committees will consider that he has a real individual responsibility for the welfare of the Society in this matter.

The work of the Committees has of late increased so considerably that the delay of communication between the Council and the Committees has on several occasions caused great inconvenience. The Council, therefore, think it well to revert to an old rule of the Society, that the Chairmen of the principal Committees shall in future be chosen from among the Members of Council.

At the unanimous request of the Orchid Committee, and on certain Members of it undertaking to pay a third of the expense, the Council have arranged to have paintings made of all the flowers Certificated by this Committee. Exhibitors must, therefore, distinctly understand that, in submitting their flowers in future to the Committee, they thereby tacitly consent to their being painted should they obtain any award, and must hold themselves ready to give all reasonable facility to the Society's Artist to do so. The Orchid Committee desire to have these paintings as an accurate record of the characters and peculiarities of the plants to which awards are made, finding it practically impossible for their Members to bear in mind the details of numerous flowers often seen but once.

The Council desire to draw the attention of all Fellows of the Society to the more extended use which the Scientific Committee might be to them if they availed themselves more freely of their privileges in submitting instances of diseases of or injuries to plants, caused by insects or otherwise. The Scientific Committee is composed of gentlemen qualified to give the best advice on all such subjects, either in respect to the prevention or cure of disease. The Committee is also glad to receive specimens of malformation or other subjects of Horticultural or Botanical interest.

The Council wish to express their thanks to the Director of the Royal Gardens, Kew, for allowing them to consult Mr. Massee, F.L.S., on the fungoid diseases, &c., brought before the Scientific Committee, and to that gentleman for his readiness in giving them the advantage of his knowledge and advice.

The Society's Great Show held (by the continued kindness of the Treasurer and Benchers) in the Inner Temple Gardens, was as successful as ever, and it is a matter of satisfaction to the Council to find that this Meeting is now universally acknowledged to be the leading Horticultural Exhibition of this country. The best thanks of the Society are due to all who kindly brought their plants for exhibition, or otherwise contributed to the success of this Show.

The Exhibition of British Grown Fruit held by the Society at the Crystal Palace, on October 1, 2, and 3, was, considering the season, eminently satisfactory. Full particulars will be found in Vol. xx., part 2, of the *Journal*, issued in December.

As an object lesson in British Fruit cultivation this Annual Show stands unrivalled, and is of national importance. The Council invite Fellows and their friends to support it, for it cannot be too widely known that the continuance of the Show year by year is absolutely dependent on at least £100 being raised by subscription each year towards the Prize Fund. The Show involves the Council in a very large expenditure without the possibility of any return. They have therefore established the rule that they will not continue it unless sufficient interest in it is taken by Fellows and their friends to raise £100 towards the Prize Fund. Subscriptions for this purpose should be sent at once to the Secretary, 117 Victoria Street, Westminster, and if the list prove satisfactory the Schedule will be issued in April, and the Show held on September 30 and October 1 and 2, 1897. The list of subscribers for 1896 will be found on page 129 of Vol. xx., part 2, of the Society's *Journal*.

Deputations were sent by the Council, at the invitation of the local authorities, to attend the Great Horticultural gatherings at York in June, and at Chester in August, 1896. Full particulars of these visits will be found in the Society's *Journal*, Vol. xx., part 1, p. xxvii., and Vol. xx., part 2, p. cxxx. The Council cannot, however, refrain from taking this opportunity of congratulating York and Chester on the admirable displays of Horticultural skill and enterprise made at their respective *fêtes* and galas, and of recording the very great pleasure which these visits gave them, and their appreciation of the great courtesy and hospitality with which they were received in both cities.

The *Journal* of the Society has been continued so as to

enable Fellows at a distance to enter more fully into and reap the benefits of the study and work of those actively engaged at head-quarters. Vol. xix., Part 3, and Parts 1 and 2 of Vol. xx., were issued during the year, and Vol. xx., Part 3, is now almost ready for issue.

In January, 1893, the Council published a list of all the Plants, Flowers, Fruits, and Vegetables certificated from the year 1859 to 1892. A Supplement is now ready, bringing the list down to December, 1896. Each part is issued at the price of One Shilling, but the two together may be obtained for Eighteenpence, at the Society's Office.

An examination in the principles and practice of Horticulture was held on May 1st, concurrently in different parts of the United Kingdom, a centre being established wherever a magistrate, or clergyman, or schoolmaster, or other responsible person accustomed to examinations would consent to superintend one on the Society's behalf, and in accordance with the rules laid down for its conduct. No limit as to the age, position, or previous training of the candidates was imposed, and the Examination was open to both sexes. One hundred and fifty-two candidates presented themselves for examination. The names and addresses of those who succeeded in satisfying the examiners, together with the number of marks assigned to each, will be found in the Society's *Journal*, Vol. xx., Part 1, 1896, page 58.

It is proposed to hold a similar examination in 1897, but at the request of those most nearly concerned the date has been altered to Tuesday, April 6th, so as not to clash with the Examinations held at the beginning of May by the Science and Art Department. Candidates wishing to sit for the Examination should make application during February to the Secretary, R.H.S. office, 117, Victoria-street, Westminster.

The Council have heard with much pleasure that N. N. Sherwood, Esq., Master of the Worshipful Company of Gardeners, has most kindly offered, in connection with the Society's 1897 Examination, a Scholarship of £25 a year for two years; full particulars of which will be found in the Society's Arrangements for 1897, lately issued to all Fellows. Another similar Scholarship has been promised for 1898, by G. W. Burrows, Esq., a Member of the Court of the same Worshipful Company.

Acting in conjunction with the Lindley Trustees, the Council have devoted considerable attention to the Library. All serial publications have been kept up to date, a large number of valuable volumes have been bound, and the following new books, amongst others, added to the Library, viz.: "The Student's Handbook of British Mosses," "Les Vignes Americaines," "Useful Plants of Japan," "Orchids of South Africa," Scott's "Flowerless Plants," &c., &c.

A sum of £129 has been received for the Catalogue Fund, which was started in 1894, and the proof sheets of the Catalogue are now in the hands of the printer.

The hearty thanks of the Society are due to all the Members of the Standing Committees—viz., the Scientific, the Fruit and Vegetable, the Floral, the Orchid, and the Narcissus Committees, for the kind and patient attention which they have severally given to their departments.

The best thanks of the Society are also due to all those who, either at home or abroad, have so kindly presented books to the Library or plants or seeds to the Gardens. A list of the donors has been prepared, and will be found in the Society's *Journal*, Vol. xx., Part 3, 1897, now almost ready for issue. Where so many have been generous it almost appears invidious to mention any by name, yet the Council think it only their duty on behalf of the Fellows to publicly thank the principal donors, amongst whom have been Messrs. George Bunyard & Co., of Maidstone; Mr. John Fraser, of Woodford; Messrs. Lee & Son, of Hammer-smith; Messrs. Paul & Son, of Cheshunt; Messrs. J. R. Pearson and Sons, of Chilwell; Messrs. T. Rivers & Son, of Sawbridgeworth; and Messrs. Veitch and Sons, of Chelsea.

The Council wish to express, in their own name and in that of the Fellows of the Society, their great indebtedness to all who have so kindly contributed, either by the exhibition of plants, fruits, flowers, or vegetables, or by the reading of papers, to the success of the fortnightly Meetings in the Drill Hall. They are glad to find by the increased and increasing number of visitors that the Society's fortnightly Meetings are at last becoming appreciated by the Fellows and Public in general. In their judgment these shows, which take place at short intervals throughout the year, furnish horticultural displays and teach

horticultural lessons which cannot be obtained elsewhere in the kingdom.

The papers read at these meetings, which have been or will shortly be published in the *Journal*,* are as follows:—

- Mar. 10 "Melons," by Mr. J. Barkham.
 „ 24 "Saladings," by Mr. W. Iggulden.
 April 21 "Pine Apples," by Mr. H. W. Ward.
 May 5 "Species and Varieties of Tulips," by Mr. J. G. Baker, F.R.S.
 June 9 "The Movements of Plants," by the Rev. Professor George Henslow, M.A.
 „ 23 "Gardeners, Past, Present, and Future," by Mr. S. Heaton.
 July 14 "New Roses," by the Rev. H. J. Pemberton, M.A.
 „ 28 "Cacti," by Mr. E. H. Chapman.
 Aug. 11 "Fern Generation," by Mr. C. T. Druery, F.L.S.
 „ 25 "Forcing Lilies of the Valley," by Mr. T. Jannoch.
 Sept. 8 "Gladioli," by Mr. J. Burrell.
 Oct. 1 "Fruit Growing from a Food point of view," by Mr. E. J. Baillie, F.L.S.
 „ 2 "Cider and Perry Industry," by Mr. C. W. Radcliffe Cooke, M.P.
 „ 3 "Gathering, Storing, and Use of Apples and Pears," by Mr. J. Watkins.
 „ 13 "Hardy Summer Flowers," by Mr. E. Burrell.
 „ 27 "Chrysanthemums," by Mr. W. H. Lees.
 Nov. 10 "Seed Growing," by Mr. R. Fife.
 „ 24 Floral Demonstration, by the Rev. Professor George Henslow, M.A.

The Council have the sad duty of recording the death of 22 Fellows during the year, and among them they regret to find the names of Baron Ferdinand Von Mueller, one of the most staunch and energetic supporters of the Society in Australia, Dr. Trimen, Bruce Findlay, Richard Bloxam, Henry Seebohm, T. A. Gledstanes, Anthony Waterer, the Earl of Darnley, Sir Joseph Prestwich, Lord Savile, Robert Warner, Sir Julian Goldsmid, George Prince, and Marmaduke Lawson.

* Back Numbers of the *Journal* can be purchased by Fellows at reduced rates.

the Superintendent, and the Assistant-Superintendent should continue as heretofore.

The Council have had before them various proposals for celebrating the attainment by Her Most Gracious Majesty the Queen, Patron of the Society, of the longest reign in English history. Some of these proposals were for one reason or another found to be impracticable, others were found to involve a far larger expenditure of money than the Society can command or could reasonably hope in so short a period to collect. They have, therefore, after most careful consideration, decided, with Her Majesty's gracious permission, (i) to strike a special Medal or Medallion, to be called the Victoria Medal of Horticulture and to be awarded *honoris causâ* in the domain of Horticulture. They will also (ii) join in the celebration of the event which is to take place at the Great Show to be held at Shrewsbury in August to which they have received a very cordial invitation.

The proposal to strike a Victoria Medal of Honour has been submitted to Her Majesty, who whilst refraining in this as in all other cases from expressing any personal opinion on the proposed method of commemorating the 60th year of her reign, graciously adds that she "has no possible objection to raise" either to the proposal itself or to the name to be given to the Medal.

The Council in closing their Report desire most respectfully to tender to Her Majesty their most sincere and thankful congratulations on the approaching completion of the 60th year of her beneficent and auspicious reign, and they are confident that every Fellow of the Society will join with them in saying "God Save the Queen."

ROYAL HORTICUL

ANNUAL REVENUE AND EXPENDITURE

Dr.

	£	s.	d.	£	s.	d.
To ESTABLISHMENT EXPENSES—						
Salaries and Wages	677	1	0			
Rent of Office	173	3	0			
Printing and Stationery	226	7	1			
Journal—Printing and Postage	553	0	6			
Postage	96	14	6			
Coal and Gas	4	19	10			
Donation to Auricula and Primula Society	10	0	0			
Miscellaneous	119	11	1			
Commission on Advertisements	24	6	7			
Lindley Library	20	0	0			
				1,905	3	7
„ SHOWS and MEETINGS—						
Rent of Drill Hall and Cleaning	102	12	0			
Temple Show	602	3	3			
Crystal Palace Fruit Show	279	0	5			
Prizes and Medals—						
Rose Show	50	10	0			
Committees' Awards, &c.	387	9	10			
Printing, &c.	10	4	6			
Labour	75	6	6			
				1,507	6	6
„ CHISWICK GARDENS—						
Rent, Rates, Taxes, and Insurance	283	0	10			
Superintendent's Salary, &c.	218	0	0			
Pension, late Superintendent	180	0	0			
Labour	742	19	5			
Implements, Manure, Soil, Packing, &c.	141	13	9			
Coal and Coke	169	15	0			
Repairs, Ordinary	66	14	11			
Repairs, Extraordinary	506	10	0			
Water and Gas	22	5	1			
Miscellaneous	45	8	5			
				2,376	7	5
„ BALANCE TO GENERAL REVENUE						
ACCOUNT				155	8	2
				£5,944	5	8

TURAL SOCIETY.

ACCOUNT for the YEAR ending 31st DECEMBER, 1896. *Of*

	£	s.	d.	£	s.	d.
By ANNUAL SUBSCRIPTIONS				3,562	5	6
, DONATION				1	1	0
,, SHOWS AND MEETINGS—						
Temple Show	1,138	3	1			
Crystal Palace Fruit Show	238	2	5			
Drill Hall Meetings	30	19	0			
Prizes and Medals	51	15	5			
	<hr/>			1,458	19	11
, ADVERTISEMENTS IN JOURNAL, &c.				324	7	7
, SALE OF JOURNAL				53	15	7
, MISCELLANEOUS RECEIPTS				75	8	7
,, DIVIDENDS, &c.—						
Davis Bequest and Parry's Legacy ...	56	18	4			
Consols, £1,750	46	0	8			
Local Loans, £500	14	10	0			
Interest on Deposits	6	19	4			
	<hr/>			124	8	4
,, CHISWICK GARDENS—						
Produce sold	318	19	9			
Admissions	5	4	3			
Miscellaneous	19	15	2			
	<hr/>			343	19	2
<hr/>						
				£5,944	5	8

We have examined the above Accounts, and find the same correct.

(Signed) A. H. PEARSON,
HARRY TURNER,
JAMES H. VEITCH. } *Auditors.*

January 7, 1897.

HARPER BROS., *Chartered Accountants.*

ROYAL HORTICULTURAL SOCIETY.

U.

BALANCE SHEET, 31st DECEMBER, 1896.

U.

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PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

	£	s.	d.	£	s.	d.	£	s.	d.
To SUNDY CREDITORS	172	3	9						
" SUBSCRIPTIONS, 1897, paid in advance	85	11	6						
" ADVERTISEMENTS, 1897, paid in advance	6	10	0						
" LIFE COMPOSITIONS, 31st Dec., 1895	246	15	0						
Do. do. 1896	123	9	0						
" VEITCH SPECIAL PRIZES	370	4	0						
" GENERAL REVENUE ACCOUNT—	30	0	0						
Balance, 1st January, 1896	3,613	4	7						
Less Bad Debts	13	12	0						
	£3,599	12	7						
" Balance for the year 1896, as per Revenue and Expenditure Account	155	8	2						
	3,755	0	9						
	£4,419	10	0						
By SUNDRY DEBTORS—									
Annual Subscriptions outstanding, estimated at	15	15	0						
Garden Produce	15	2	5						
Advertisements	117	12	9						
Rates and Taxes (Chiswick) paid in advance	28	5	0						
Interest on Local Loans	3	12	6						
	180	7	8						
" INVESTMENTS—									
2 $\frac{3}{4}$ % Consols, £2,122. 8s. 9d. cost 1,892 11 3									
(£2,022. 8s. 9d. of this sum is held by the Society subject to the provisions of the will of the late J. Davis, Esq.)									
2 $\frac{3}{4}$ % Consols, £1,750 cost 1,768 5 0									
3 % Local Loans £500	557	11	0						
	4,218	7	3						
" CASH AT LONDON AND COUNTY BANK—									
On Current Account	17	8	4						
" CASH IN HAND—									
Head Office	1	7	11						
Chiswick	1	18	10						
	20	15	1						
	£4,419	10	0						

We have examined the above Accounts, and find the same correct.

(Signed)

A. H. PEARSON,
HARRY TURNER,
JAMES H. VEITCH,
Auditors.

HARPER BROS., Chartered Accountants.

January 7, 1897.

GENERAL MEETING.

MARCH 9, 1897.

Sir TREVOR LAWRENCE, Bart., in the Chair.

Fellows elected (38).—Col. E. A. Ball, B. C. Berkeley, Mrs. S. Berry, H. D. Bishop, Mrs. William Burgess, Lord Burghclere, Linnaeus Cumming, Viscountess Falmouth, Hedley Fox, Mrs. Gaussen, Ben. Greaves, H. F. Hartshorne, Hon. Mrs. Herbert of Llanover, Mrs. Hewitt, E. W. Hill, John Hughes, W. Innes, Dr. L. Jones, Rev. T. D. Lawton, Mrs. Gerard Leigh, Miss Leventhorpe, Lady Lilford, T. A. Morris, Abraham Moss, H. A. Ouston, Alfred Parsons, Lady Penrhyn, Lieut.-Col. R. W. Shipway, Thos. Smith, Mrs. Stucley, William Taylor, F. W. Thomas, S. Treseder, Treseder, G. Waugh, Mrs. Weller, William Weller, William White.

Societies affiliated (3).—Botley and South Hants Horticultural Society, Brighton and Sussex Horticultural Society, Woking and District Horticultural Society.

A lecture on "Microscopic Gardening," was given by Prof. H. Marshall Ward, F.R.S., F.L.S. (See p. 4.)

GENERAL MEETING.

MARCH 23, 1897.

Mr. JAMES DOUGLAS in the Chair.

Fellows elected (18).—John Robert Bell, James R. D. Bodenham, Lady Castletown, J. Coles, Henry Esling, Lady Ebrington, W. T. Frost, Mrs. Greer, W. N. Hague, J. A. Horrell, E. Jones, A. Luff, H. Perkins, Matthew Roe, J. C. Russell, Miss Sangster, Cyril Taylor, Jos. Welch.

A lecture on "Bud Transference and its effects on Fruit," was given by the Rev. Gordon Salmon, M.A. (See p. 25.)

GENERAL MEETING.

APRIL 13, 1897.

Mr. C. E. PEARSON in the Chair.

Fellows elected (28).—T. A. Acton, P. Antrobus, W. H. Apthorpe, A. Ashbridge, W. J. Baldock, A. H. Birch-Reynard-

son, Rev. A. F. R. Bird, D. P. Blaine, A. Chapman, J. Clark Mrs. L. Drummond, Stanley Flint, Mrs. Freeman, A. E. Gibbs, J. J. Hewitt, Hon. Lady Higginson, Mrs. A. Landon-Teape, John Yates Landon-Teape, Lady Manners, A. Marshall, C. T. Musgrave, W. E. B. Ormerod, Col. A. B. Portman, G. Rawlings, F. Lewis Reeves (Australia), Thomas Senior, Mrs. John Thompson, Viscountess Wolseley.

Society affiliated (1).—Downend Industrial Exhibition Society.

A lecture on "Artificial Manures," was given by Mr. J. J. Willis. (See p. 36.)

GENERAL MEETING.

APRIL 27, 1897.

Rev. G. H. ENGLEHEART in the Chair.

Fellows elected (19).—William E. Beard, Augustus Bowles, W. W. Bunting, Rev. J. J. Coxhead, Mrs. S. C. Davis, Sir Maurice Fitz-Gerald, Mrs. G. Glossop, William A. Hunt, Henry P. Jilliard, James Kenman, G. W. Leak, Arthur Lewis, Josiah Messent, A. Methven, Lord Mount Stephen, Patrick W. R. Murray, Miss R. Peyman, Robert White, W. Workman.

A lecture on "Winter and Spring Bedding" was given by Mr. A. Dean. (See p. 65.)

GENERAL MEETING.

MAY 11, 1897.

Mr. R. McLACHLAN, F.R.S., in the Chair.

Fellows elected (13).—E. Carr, G. Clarke, F. R. Crane, L. E. Fawcus, W. A. Gillett, F. J. Greenwell, D. Hill, Earl of Ilchester, G. Kelf, Jos. Lamb, R. McDonald, Cecil S. Paget, R. F. Todhunter.

A lecture on "Diseases of Plants" (illustrated by magic lantern slides) was given by Mr. Geo. Massee, F.L.S. (See p. 77.)

THE TEMPLE SHOW, 1897.

MAY 26, 27, and 28.

By kind permission of the Treasurer and Masters of the Bench, the Society held its tenth great Annual Flower Show in the Gardens of the Inner Temple on Wednesday, Thursday, and Friday, May 26, 27, and 28, 1897.

The weather was fairly good, that is to say, it was a mixture of rain, sunshine, and wind, the second day being far more propitious than the first and last.

The exhibition, which was superior in quality and cultural skill to any of its predecessors, was honoured on the first day by a visit from H.R.H. the Princess of Wales, H.R.H. the Duke of York, the Princess Charles of Denmark, and Princess Victoria. The Royal Party were received by the President, who with several members of the Council, escorted them through the whole of the exhibition.

The band of H.M. Royal Horse Guards (Blues), under the direction of Mr. Charles Godfrey, R.A.Mus., performed during the afternoon of each day.

The Awards of the Council are given below; those of the Fruit, Floral, and Orchid Committees will be found under their respective reports.

Awards made by the Council at the Temple Show, 1897:—

Gold Medal.

To Messrs. Fisher, Son & Sibray, Sheffield, for Japanese Maples, &c.

To Mr. George Mount, Canterbury, for Roses.

To Messrs. Rivers, Sawbridgeworth, for Fruit Trees in pots.

To Messrs. de Rothschild, Gunnersbury (gr. Mr. Hudson), for Fruit Trees in pots, Myrtles, &c.

To Baron Schröder, The Dell, Staines (gr. Mr. Ballantine), for Orchids.

To Messrs. James Veitch & Sons, Chelsea, for Hardy Flowers,

Shrubs, Cactus, Caladiums, Streptocarpus, Vegetables, &c.
(Fig. 10.)

Note.—For the use of most of the following illustrations of the Temple Show we are indebted to the kindness of the Editor of *Country Life Illustrated*.

Cups.

To Messrs. Low & Co., Clapton, for Orchids, Caladiums, and Cannas.



FIG. 10.—FLOWERING SHRUBS SHOWN BY MESSRS. J. VEITCH & SONS.

To Messrs. W. Paul & Son, Waltham Cross, for Roses and Rhododendrons.

To Messrs. Paul & Son, Cheshunt, for Roses, Cannas, and Alpine Plants.

To Messrs. Charlesworth & Co., Heaton, Bradford, for Orchids.

To Messrs. Barr & Son, Covent Garden, for Herbaceous Plants.

To Messrs. Backhouse & Son, York, for Alpine and Hardy Plants.

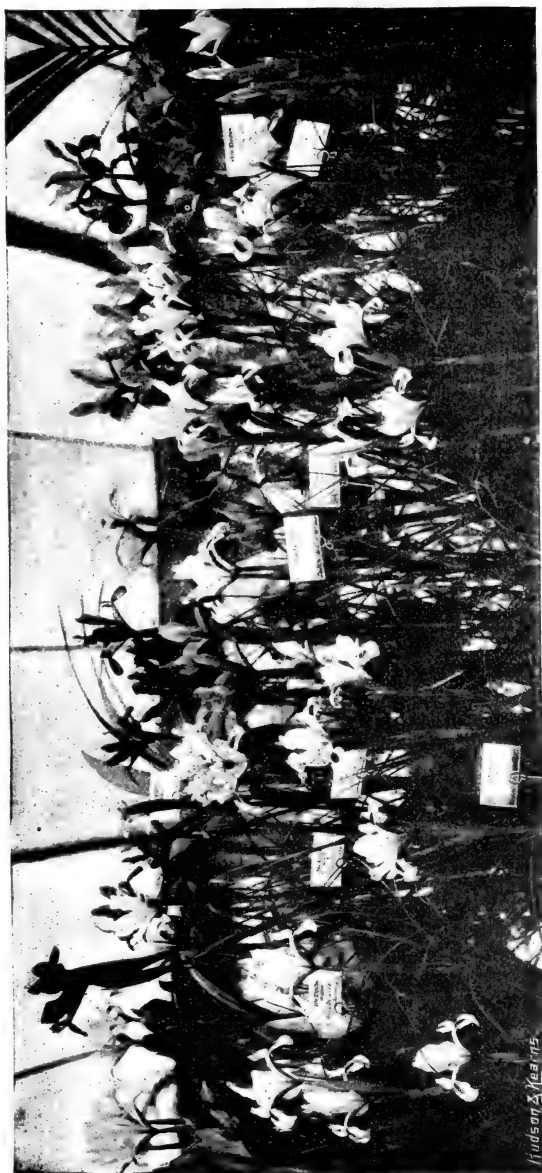


FIG. 11.—SPANISH IRISES, SHOWN BY MESSRS. WALLACE & CO.

To Messrs. Wallace & Co., Colchester, for Lilies, Irises, &c.
(Fig. 11.)

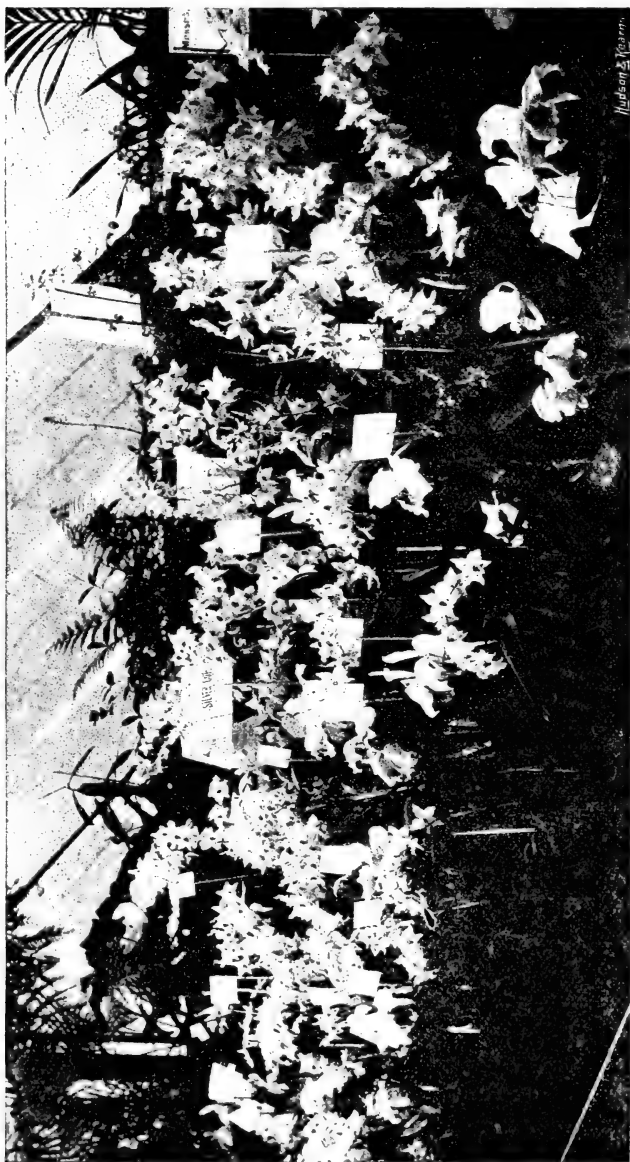


FIG. 12.—GROUP OF ORCHIDS, SHOWN BY MESSRS. LINDEN & CO.

To Messrs. Linden, l'Horticulture Internationale, Parc Leopold, Brussels, for Orchids. (Fig. 12.)

To Messrs. Dobbie & Co., Rothesay, N.B., for Violas, and Pansies.

To Sir J. W. Pease, Bart., Hutton Hall, Guisboro' (gr. Mr. McIndoe), for Fruit.

To Mrs. Wingfield, Ampthill House, Beds (gr. Mr. Empson), for Fruit and Vegetables.

To Sir W. G. Pearce, Bart., Chilton Lodge, Hungerford (gr. Mr. C. Beckett), for Fruit.

To Messrs. F. Sander & Co., St. Albans, for new Plants. (Fig. 13.)

To Messrs. Carter & Co., High Holborn, for Calceolarias and Gloxinias. (Fig. 15.)

To Mr. Charles Turner, Slough, for Roses.

To Messrs. Laing, Forest Hill, for Caladiums and Begonias.

To Messrs. Jones & Sons, Shrewsbury, for Decorations.

To Messrs. Cannell & Sons, Swanley, for Begonias, Calceolarias, Cannas, and Gloxinias.

To Messrs. Sutton & Sons, Reading, for Begonias, Caladiums, and Flowering Plants. (Fig. 17.)

Silver-gilt Flora Medal.

To Mr. J. Cypher, Cheltenham, for Orchids.

To Mr. H. J. Jones, Ryecroft, Lewisham, for Begonias, &c.

To Mr. J. R. Box, Croydon, for Begonias.

To Mr. T. S. Ware, Hale Farm, Tottenham, for Begonias, &c. (Fig. 18.)

To Messrs. James & Son, Farnham Royal, for Calceolarias.

To Messrs. Cutbush & Son, Highgate, for Carnations.

To His Grace the Duke of Marlborough, Blenheim (gr. Mr. Whillans), for Carnations. (Fig. 19.)

To Guildford Hardy Plant Nursery for Hardy Plants. (Fig. 20.)

To Messrs. J. Waterer & Sons, Bagshot, for Rhododendrons and Japanese Maples.

To Messrs. J. Peed & Sons, Norwood, for Gloxinias and Caladiums. (Fig. 16.)

To Earl Percy, Syon House, Brentford (gr. Mr. Wythes), for Orchids and Fruit.

To Mr. H. B. May, Edmonton, for Ferns, &c.

To Messrs. Fromow & Sons, Chiswick, for Japanese Maples.



FIG. 13.—CATTLEYA REINECKIANA, SHOWN BY MESSRS. F. SANDER & CO.

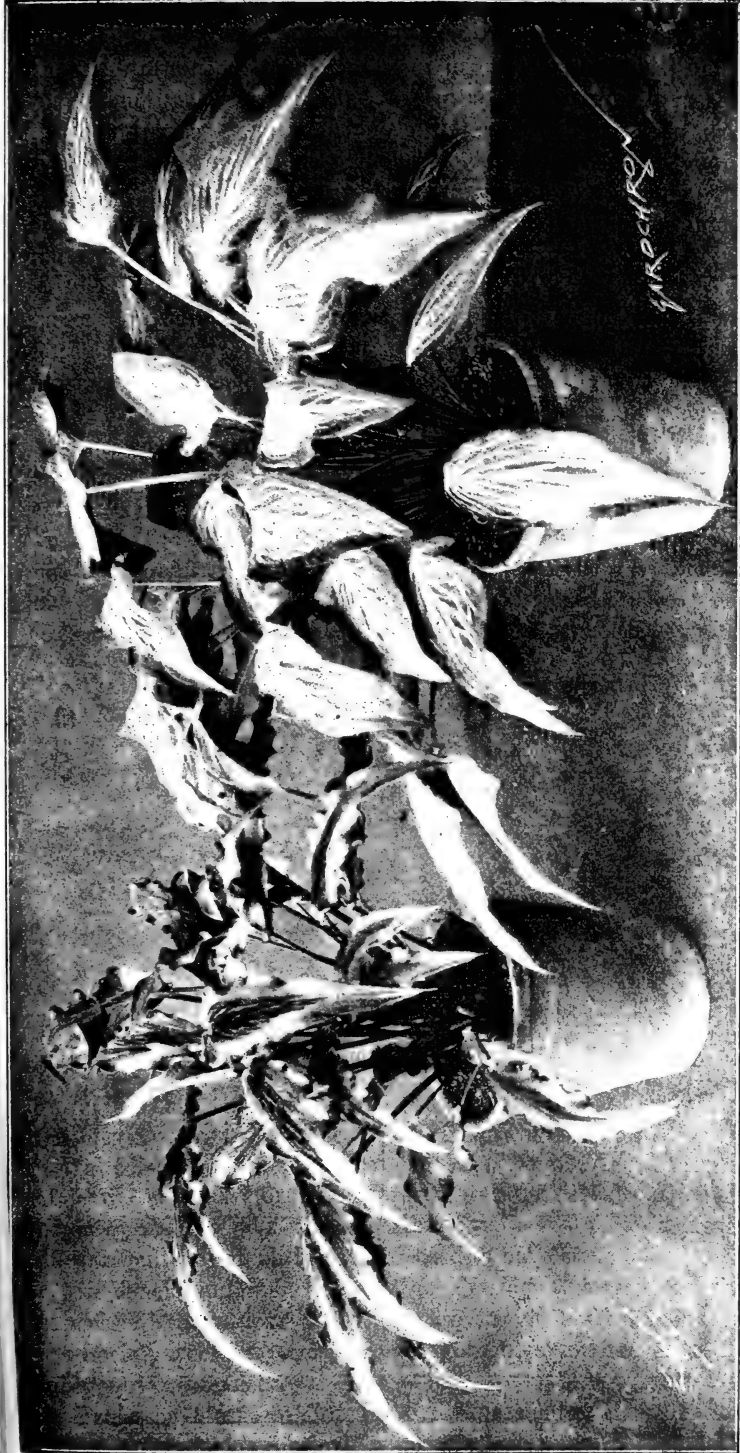


FIG 14. - CALADIUM ALBANENSE.

CALADIUM SPECIOSUM.

(Gardener's Chronicle.)



FIG. 15.—CALCEOLARIAS & C., SHOWN BY MESSRS. J. CARTER & CO.

To Messrs. Cripps & Son, Tunbridge Wells, for Japanese Maples, &c.

To Messrs. Wills & Segar, Onslow Crescent, South Kensington, for Palms, &c.

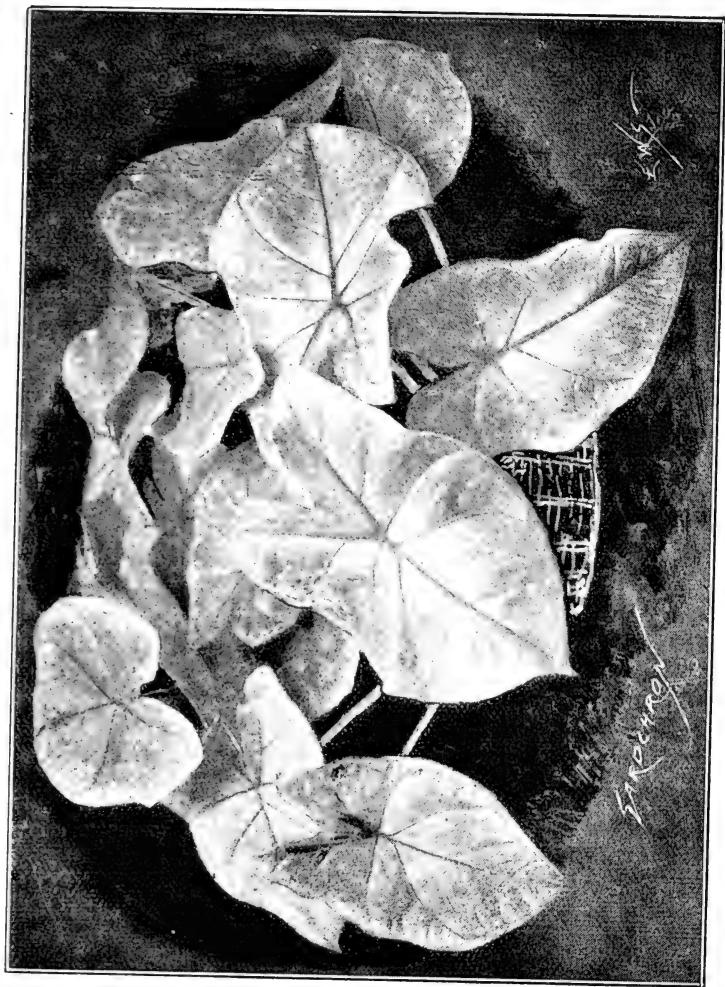


FIG. 16. — NEW CALADIUM "THOMAS PEED." (*Gardeners' Chronicle.*)

To Mr. W. Ruinsey, Waltham Cross, for Roses.

To Messrs. Kelway & Son, Langport, Somerset, for Pæonies, &c.

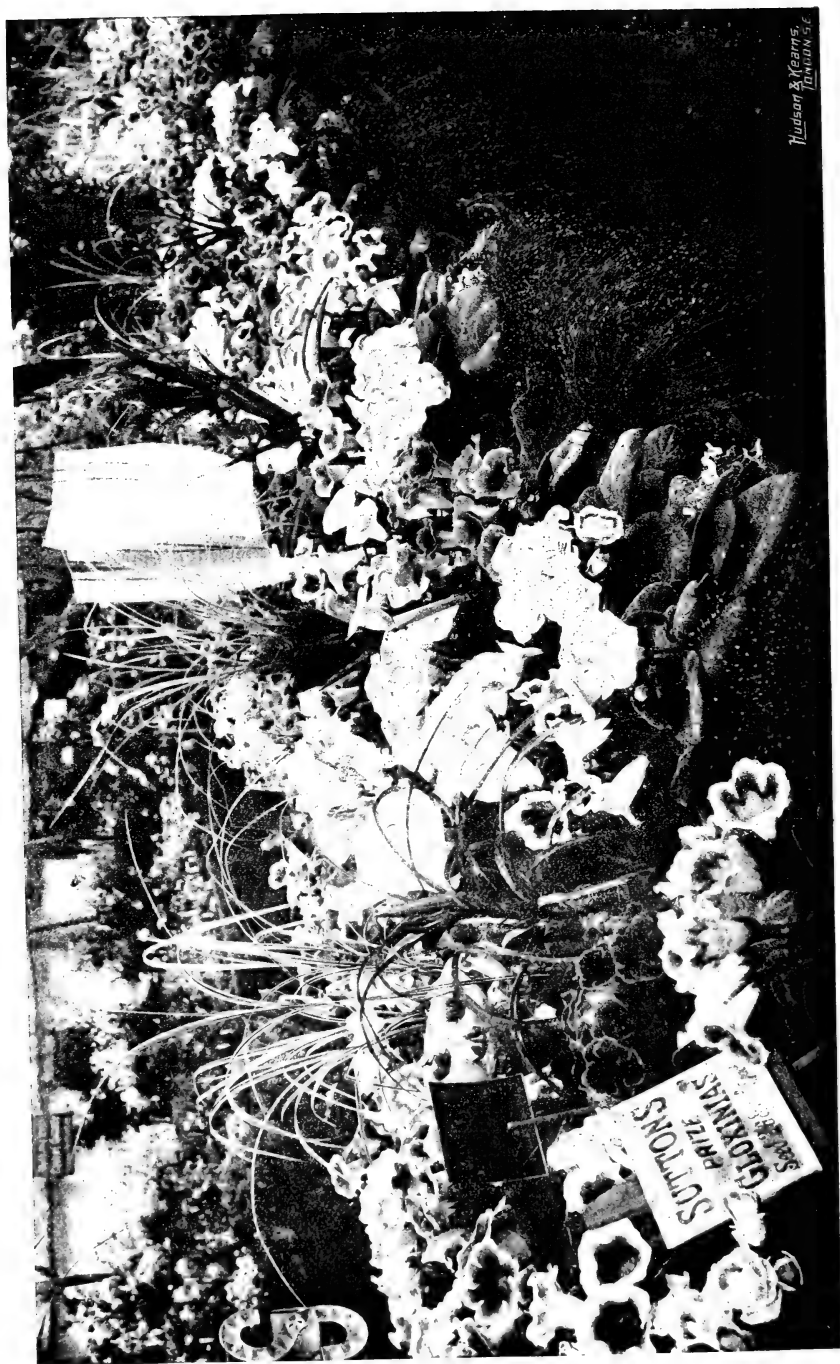


FIG. 17.—GLORIOSAS, SHOWN BY MESSRS. SUTTON & SONS.

Hudson & Kearns,
LONDON, S.E.

To Mrs. Phippen, Reading, for Decorations.
 To Mr. Moyses Stevens, Victoria Street, S.W., for Decorations.
 To Mrs. W. Green, Romford, for Table Decorations.
 To Messrs. Perkins, Coventry, for Decorations.
 To Miss M. Foden, for Table Decorations.
 To Sir F. Wigan, Clare Lawn, East Sheen (gr. Mr. W. H. Young), for Orchids.
 To Messrs. Lewis & Co., Southgate, for Orchids.



FIG. 18. - DOUBLE BEGONIAS, SHOWN BY MR. T. S. WARE.

Silver-gilt Knightian Medal.

To Messrs. Bunyard, Maidstone, for Fruit Trees in Pots, Apples, &c.

Silver-gilt Banksian Medal.

To Pantia Ralli, Esq., Ashsted Park, Epsom, for Caladiums.
 To John T. Bennett-Poë, Esq., Cheshunt (gr. Mr. Downes), for Florist's Tulips.
 To Messrs. W. & J. Birkenhead, Manchester, for Ferns.
 To Mr. W. Iceton, Putney, for Foliage Plants.

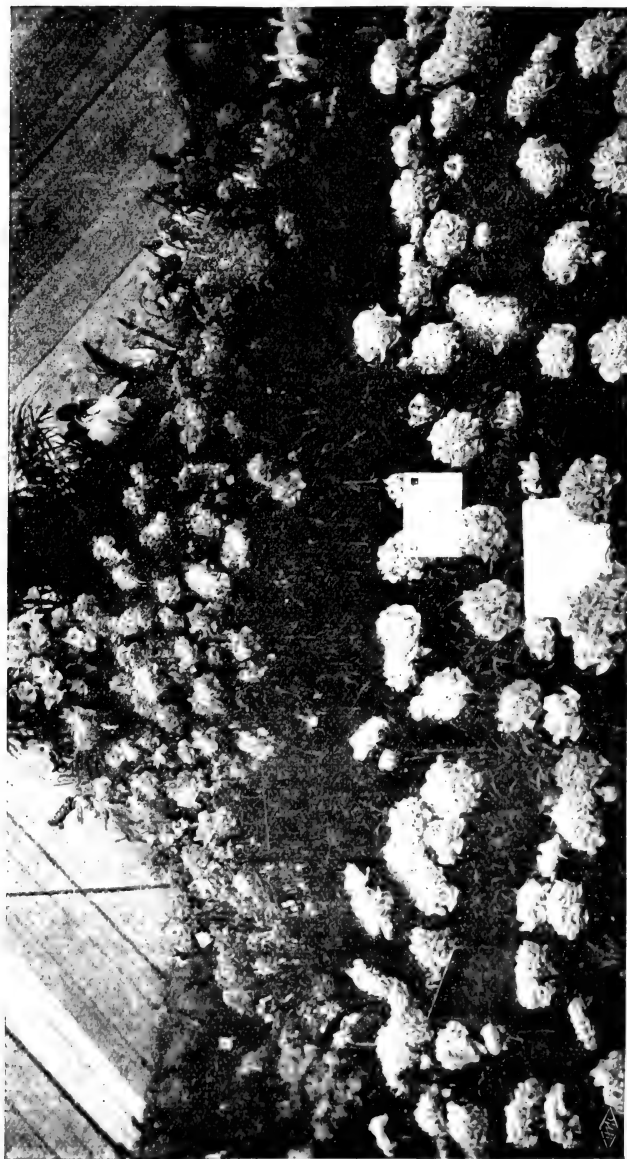


FIG. 19.—MALMAISON CARNATIONS, SHOWN BY THE DUKE OF MARLBOROUGH.



FIG. 20.—ROCKERY ARRANGED BY THE GUILDFORD HARDY PLANT NURSERY.

To Mr. George Featherby, Gillingham, Kent, for Grapes, &c.
To Marquis of Northampton, Castle Ashby (gr. Mr. Hayes),
for Vegetables.

To Mr. J. Prewett, Hammersmith, for Table Decorations.

To Mr. L. H. Calcutt, Stoke Newington, for Floral
Decorations.

To Messrs. B. S. Williams, Upper Holloway, for Orchids.

To W. A. Gillett, Esq., Bishopstoke, Hants (gr. Mr. E. Carr),
for Orchids.

To Welbore Ellis, Esq., Hazlebourne, Dorking (gr. Mr.
Barrell), for Orchids.

To W. Thompson, Esq., Stone, Staffs (gr. Mr. Stevens), for
Orchids.

To Messrs. R. Smith & Co., Worcester, for Clematis.
(Fig. 21.)

To Mr. M. Prichard, Christchurch, for Herbaceous Plants.

To Messrs. Balchin & Sons, Hassocks, for New Holland
Plants.

To Messrs. J. Cheal & Sons, Crawley, for Herbaceous Plants.

Silver Flora Medal.

To Messrs. Jackman & Son, Woking, for Clematis and Herb-
aceous Flowers.

To Mr. B. Ladhams, Shirley, Southampton, for Hardy
Flowers.

To F. Hardy, Esq., Tyntesfield, Manchester (gr. Mr. Stafford),
for Orchids.

To Messrs. W. Brown & Sons, Stamford, for Cut Flowers.

To Mr. H. O. Garford, Stoke Newington, for Decorations.

To Messrs. Edwards & Son, Sherwood, Notts, for Decorations.

To L. Mond, Esq., Regent's Park (gr. Mr. Clarke), for
Orchids.

To Mons. E. Piret, Argenteuil, France, for Orchids.

To Mr. John Forbes, Hawick, N.B., for Carnations.

To Mr. G. Stevens, Putney, for Carnations.

To Mr. A. W. Young, Stevenage, for Gloxinias, &c.

Silver Knightian Medal.

To Mons. A. Belin, Argenteuil, France, for Asparagus.

To Mr. F. Chapman, Colchester, for Asparagus.



FIG. 21.—CLEMATIS, SHOWN BY MESSRS. RICHARD SMITH & Co.

To Messrs. Laxton Bros., Bedford, for Strawberries.

To the Horticultural College, Swanley, for Vegetables.

To Mr. W. W. Palmer, Andover, for Strawberries.

Silver Banksian Medal.

To Malcolm S. Cooke, Esq., Kingston (gr. Mr. Buckell), for Orchids.

To Major James Joicey, Sunningdale (gr. Mr. Thorne), for Orchids.

To Mons. A. A. Peeters, Brussels, for Orchids.

To Messrs. R. & G. Cuthbert, Southgate, for Azaleas.

SCIENTIFIC COMMITTEE.

JANUARY 12, 1897.

Mr. MICHAEL in the Chair, and six members present.

Tomatos Diseased.—It was reported from Kew that the specimens exhibited at the last meeting were too much decayed to be able to ascertain what fungus, if any, had caused the disease.

Senecio multiflorus, Hybrids.—Mr. Lynch exhibited a number of specimens which he had raised by crossing *S. multiflorus* with various forms of the garden or cultivated *Cineraria*. The colours much resembled those of the latter plant, the foliage being intermediate, and the height about 3 feet. All but one had *S. multiflorus* as the female parent, the results showing therefore great prepotency on the part of the male (*Cineraria*). *S. multiflorus* was first introduced from the Canaries in 1855 ("Bot Mag." tab. 4994, *Doronicum Bourgæi*). It was subsequently lost from Kew and reintroduced to Cambridge by Mr. Gardener in 1895. Some of the flowers showed a peculiar circular white spot on the red tip of the petals.

Cineraria cruenta.—Mr. Douglas said that he is raising seedlings of this plant, in order to see if it varies towards the cultivated forms without being crossed. Mr. Lynch observed

that *C. Tussilaginis* was a species which apparently most nearly resembled the cultivated *Cineraria*.

White Narcissus, Artificially Coloured.—Dr. Russell exhibited some cut flowers of white *Polyanthus Narcissus*, which he had placed in solutions of acid red magenta (Judson) dye, and in acid green. The colours had traversed the fibro-vascular cords, and then spread over the intermediate tissues, forming a border round the ends of the petals. He proposes investigating the matter to try and discover the general nature of those colours which will act in this way. It took from 12 to 15 hours to infuse the perianths. Mr. Henslow remarked that John Laurence in his book on gardening (1726), says that people in his day used to colour flowers by letting the roots lie in a solution of the lees of claret.

SCIENTIFIC COMMITTEE, FEBRUARY 9, 1897.

Dr. M. T. MASTERS, F.R.S., in the Chair.

Coniferous Woods.—Dr. Masters exhibited specimens of Deodar, Larch, and Cedar of Lebanon, grown by Mr. J. Simpson at Wharnccliffe. They were said to have been planted at the same time, about thirty years ago. It was remarkable that the heartwood of the larch and deodar were much alike, while that of the cedar was different, in not being so darkly coloured as the others. The quality was in each case good, especially that of the larch. It has been observed by Dr. Tristram that the wood of the cedars grown on Mount Lebanon is much closer in grain and darker in colour than that of trees grown in England. ("The Nat. Hist. of the Bible," p. 343.)

Species of Thuya.—Dr. Masters also exhibited specimens from Mr. A. D. Webster and others, illustrative of the confusion in the nomenclature of this genus. He observed that *T. occidentalis* grows in the Atlantic States of North America, and *T. gigantea* (Lobbi) on the north-western or Pacific side. A form originally named *T. plicata* was introduced at the end of the last century by Menzies from Vancouver. In Donn's "Catalogue of the Plants of the Botanic Gardens at Cambridge" this plant is recorded, but without description. As this is a western species, it is really synonymous with, or at most, a

variety of what is now generally called *T. gigantea*. But the original *T. plicata* having probably died out, the name has now become transferred to a form or variety of *T. occidentalis* from the Atlantic side of the United States. It is probable that both species are represented by a "*plicata*" variety; but it is not certain whether the Pacific variety is now in cultivation. Specimens of the original *plicata* from Vancouver are in the Herbarium of the British Museum, so that it is a question whether, strictly speaking, the name *T. gigantea* should not be superseded by that of *T. plicata*. The plant now bearing that name should then be called *T. occidentalis* var. *plicata*.

Sisal Fibre.—A sample of this fibre extracted from *Agave sisalana* was received from Mr. W. Floyer, of Basingstoke. It was grown at the experimental farm at Mualla, near Luxor, by Mr. E. A. Floyer, of Cairo. He hopes to grow enough to supply all the bags for Egyptian sugar, cotton, &c. The fibre is very white, and extremely strong. The Governor of Malta is anxious to introduce the cultivation of this *Agave* into that island; but as all the uncultivated parts of the island consist of hard, exposed rock it is doubtful if it would pay, even if the climate proved suitable. The name was given to the fibre imported from Yucatan ("Kew Bull. of Misc. Inform.," March 1887).

SCIENTIFIC COMMITTEE, MARCH 9, 1897.

Dr. M. T. MASTERS, F.R.S., in the Chair, and eight members present.

Beetles with Grapes.—Mr. McLachlan had received some small beetles found about the roots of Vines, about a quarter of an inch long, with a blunt thorax and rather sluggish in manner. They proved to be *Trox sabulosus*, and were introduced in the crushed bones used for manure. Not being vegetable feeders they do no harm to the Vines. The best trap would be a dried rabbit skin with the inner side downwards.

Larvæ of Daddy Longlegs.—He also received a sample of propagating soil in which Iceland Poppies were grown, abounding with the larvæ of this fly. Bisulphide of carbon, cyanide of potassium ($\frac{1}{2}$ to 1 per cent. solution in water), or to remove the soil and burn it, were methods recommended in such cases.

Apple Root with Adventitious Buds.—Dr. H. Müller exhibited a specimen, thickly covered in places with innumerable buds, usually known as “Burr Knot.” The original cause is obscure, but Dr. Masters observed that such roots are often cut up and used for propagating.

Hyacinths, &c., with Root Failure.—A collection of bulbous plants were received from Mr. W. C. Atkinson of Aiglwath, Liverpool, in which the roots had been very imperfectly developed, and then arrested and decayed. Mr. Douglas undertook to investigate the case, Dr. Masters observing that the bulbs might not have been properly ripened before lifting.

Drift Wood from Arctic Seas.—Dr. M. T. Masters exhibited specimens of wood obtained by Dr. Nansen. They had travelled from Siberia to Franz Joseph Land, and consisted of the Siberian *Pinus cembra* (dwarf form), Willow, Elm, &c.

SCIENTIFIC COMMITTEE, MARCH 23, 1897.

Rev. W. DOD in the Chair, and six members present.

Bulbs with Arrested Roots.—With reference to the samples sent to the last meeting by Mr. Atkinson, Mr. Douglas was of opinion that the treatment had perhaps not been quite advisable, for he thought that they should have been put out of doors, and not in a shed, and covered with 6 inches of cocoa-nut fibre. If, however, there was something deleterious in the compost sent for inspection, this could be at once ascertained by analysis.

Wireworms among Carnations.—Mr. Weguelin of Torquay asked for remedies against this trouble. The suggestions of linseed cake, carrot, scooped out potatoes, as for slugs, &c., were made, but it would appear that in the present case the wireworms were too numerous for any such like traps. Gas lime was recommended as the only now efficient remedy, but it might injure the Carnations. The land having been well dressed with lime or soot shows that these ingredients are quite insufficient, though gas lime would probably have been effective.

Carnation Leaves Diseased.—Mr. Fagents of Honey Pots, Westfield, Woking, sent some leaves with peculiar red streaks

upon them. They were forwarded to Kew for further investigation.

Germination of Mushrooms.—Inquiries were made by Mr. Baker, of Cobham Park, as to somewhat contradictory statements in books upon this subject, as in Mr. J. Wright's "Primer of Horticulture" it is stated that it has been observed, whereas in Dr. Scott's "Flowerless Plants" (page 268), it appears to have never been seen. Mr. W. G. Smith, having been appealed to by the Secretary for his opinion, writes as follows:—"I have many times seen the spores of the Mushroom and its allies germinating. With me they have often quickly germinated on glass, and more often on moist blotting paper. The fungi must be allowed to shed their ripe spores on to the moist paper. After a day or two a damp microscopic slide must be placed upon the part of the damp paper where the spores have fallen, and it will often happen that some will be found to have germinated. I have seen the germinating examples whilst drawing the spores with a camera lucida. . . . Messrs. Wood of Wood Green managed to get spawn of the Morel (from material sent by me) to germinate and form spawn. I once exhibited before the R.H.S. examples of *Coprinus atramentarius* raised by me from spores. This species can be easily raised (and it is not very far removed from the Mushroom) from spore to perfect fungus. The time it takes is three months. I believe some of the French manufacturers of Mushroom spawn have raised Mushrooms direct from the spores. The spores of some of the allies of the Mushroom germinate readily in expressed juice of horse dung. I have many times seen them, and am not the only person who has seen them on glass."

Trametes radiceperda, Hartig.—Dr. Plowright sent a specimen of this fungus "to illustrate the mode in which it develops its hymenophore upon the roots of an affected Scotch Fir. The hymenium is resupinate. The fungus finds an entrance into the roots of living Fir trees by the extremities of the mycelian hyphæ insinuating themselves between the bark scales. It rapidly extends between the living bark and wood, and soon reaches the wood itself, which it at once destroys. The mycelium can travel in the ground from tree to tree."

Barley-smut.—Dr. Plowright also sent the following communication upon the injurious effect of this fungus upon the

colour of the crop. "It is only a few years ago—a very few when one looks back upon it—that our attention was drawn by Mr. J. L. Jensen of Copenhagen to the fact that there are two distinct kinds of smut upon Barley. At first there was a considerable disinclination to regard these two smuts as being due to two distinct species of *Ustilago*; but since they are not only easily distinguishable by the unaided eye, but also differ in the size and form of their spores, and as the latter have been found to germinate in a totally distinct manner, there is now no doubt about it. Our American confrères at the time repeated the protective measures suggested by Mr. Jensen, and confirmed their efficacy; but here the matter stopped, for the simple reason that the damage done by smut was trivial, and from a monetary point of view the dressing of seed Barley was a needless expense. A few days ago a circumstance came under my notice which materially alters the complexion of the case. A gentleman who is rather an extensive grower of Barley in West Norfolk drew my attention to the fact that two years ago his Barley was of an excellent colour, while it was in the stack; but when it was threshed it was so discoloured that he had to accept a very low price indeed for it. He attributed the damage in colour to the number of smutted ears which remained intact when the crop was harvested, but which, by being broken up in the process of threshing, discoloured the whole sample, just in the same way as bunted Wheat does. Fortunately he had kept some of this discoloured Barley. On inspection it looks as if it had been damaged by exposure to the weather. When a little of it, however, is shaken in a test tube with clean water the water becomes discoloured, and a drop placed under the microscope is seen to be full of *Ustilago* spores. So convinced was this gentleman of the cause of the discoloration that in the next season he dressed his seed Barley with the ordinary sulphate of copper dressing, which is used for seed Wheat for the prevention of bunt. The result was eminently satisfactory; for that year his crop was free from the disease, and the grain, of good colour, realised a proportionately good price. The ordinary *Ustilago carbo*, as it used to be called, has no detrimental effect on Barley, beyond destroying a certain percentage of plants, its spores being all blown away long before the harvest; but with the species in question, which, by the way, has received already a considerable number

of names—Mr. Jensen originally called variety *tecta*—the ears retain their shape, the awns do not fall off, and the kernels are converted into solid compact masses of black spores; not so compact, however, as to withstand the concussion of the threshing machine without being disintegrated into fine powder, which becomes scattered over the healthy kernels.” With this communication were received:—“(1) Specimen of the compact form of Barley-smut, gathered on the 15th of last July, at which time the common Barley-smut had all disappeared from the field. (2) Three samples of Barley, two of which are discoloured by the smut, as may be shown by shaking them in water and examining the washings. (3) A sample of healthy Barley from which no spores could be washed.”

A vote of thanks was unanimously given to Dr. Plowright for his interesting communications.

Portugal Laurel with Defective Foliage.—Rev. W. Wilks showed branches, one healthy for comparison, the other showing a silvery appearance. It is a well-known case, and apparently attributable to defective nutrition. The peculiarity resides in the fact that the upper epidermis becomes detached, and the presence of air gives the whitish appearance. The palisade tissue also separates readily from the mesophyl, and its cells are easily broken asunder. There is no trace of fungi or other organism. Mr. Henslow observed that a tree in his garden exhibited the same appearance and died. Its roots were found to have penetrated pure gravel.

SCIENTIFIC COMMITTEE, APRIL 13, 1897.

DR. M. T. MASTERS, F.R.S., in the Chair.

Mushrooms Raised from Spores.—With reference to this subject, the following communication was received from Dr. D. H. Scott:—“Mr. Massee, of Kew, has referred me to what seems to be a thoroughly successful solution of the problem, how to raise Mushrooms from spores. Two French authors, Costantin and Matrachot, have raised five varieties true from spores, carrying on their culture in sterilised food solutions, and subsequently on sterilised manure. The whole development is

said to take from six to seven months." ("Comptes Rendus," vols. 117 and 118, 1893-4.)

Wireworms, Cure for.—With reference to this, discussed at the last meeting, Dr. Masters remarked that mustard as powder, or dug in green, had proved to be effective in destroying this pest.

Daffodil with Frilled Corona.—Dr. Masters exhibited a blossom having this peculiarity which occurs also on Cyclamens, Primroses, &c. The structure of the fibro-vascular cords is peculiar in the Daffodil in having its elements reversed in position from those of the perianth itself. It was received from Mr. Dick, of the firm of Messrs. Cooper, Taber & Co.

Anemone fulgens.—He also showed specimens of this flower from the Riviera, and also the Greek form with rounded sepals. Several of the former were becoming double, just as is the case in South of France. Dr. Masters observed that the wild Anemone, *A. nemorosa*, had become double in his garden after some years' growth. Mr. Henslow added that the same had occurred with him; specimens originally single, received ten years ago from woods in Wiltshire, were now semi-double.

Larvæ of Bibio.—Mr. McLachlan observed that an error occurred in the statement about propagating soil containing the larvæ of daddy-longlegs in the report of the meeting on March 9. It should have been that of a species of *Bibio*.

Tulip Leaves Discoloured.—Mr. F. W. Thomas, of Wannock, near Polegate, Sussex, sent specimens of leaves showing discoloration. They were forwarded to Kew for examination.

Cineraria cruenta.—Mr. Herrin, of Dropmore, sent specimens of the original form of this plant, exhibiting different shades of colour as well as a cross between it and the garden form. The latter was of a deep crimson tint.

Daffodils synanthic.—Rev. C. W. Dod sent two specimens, each consisting of two flowers, of which the stalks were fused for the entire length from base to flower; they were the var. Empress. He observes that in one case "the union was by a superficial membrane only; but in the other the combination was complete, the joint scape being hollow at the base, without any visible joining."

Earthnuts.—Mr. Wilks brought specimens of this umbellifer, which is common in the woods and hedges and open hills about

Croydon, the tubers being much eaten by children in that neighbourhood. He remarked that two children, of the ages two and ten, had lately died, apparently poisoned by eating the leaves of some wild plant, but its nature could not be discovered.

SCIENTIFIC COMMITTEE, APRIL 27.

Dr. M. T. MASTERS, F.R.S., in the Chair, and two members present.

Tulips Diseased.—With reference to the Tulips “Golden Crown” sent to the last meeting by Mr. Thomas of Polegate, the following is the report received from Kew:—“The leaves are attacked by a fungus called *Botrytis vulgaris*, a destructive parasite to various bulbous plants. The mycelium of the fungus travels down the tissues of the host plant and forms minute sclerotia in the bulb and also in the soil in which the plant is growing. These sclerotia remain dormant during the winter, and commence to grow the following spring when the young leaves appear. Your correspondent is right in supposing that he will get no blooms. The wisest thing to do would be to remove all the diseased plants. It would not be wise to plant bulbs in the soil where the diseased plants have grown for the next two years. If this cannot conveniently be avoided, then let him plant ‘trap-plants’—that is, comparatively worthless bulbs—to take up the spores and sclerotia present in the soil, and then remove them early in the summer before more sclerotia or spores are formed.”

Podisoma sabinae.—Mr. E. Pollard, of Colwall, Great Malvern, sent a specimen of Savin having the yellow jelly-like outgrowth of this fungus from the stem. It is dimorphic, the second stage being called *Ræstelia cancellata* and is found growing on roseaceous trees.

Pinus Torreyana.—Dr. Masters exhibited specimens of the large cones of this tree. It was found on the extreme southern coast of California, extending over about three to four miles only, and the group consisted of from 200 to 300 trees. It has since been discovered on the island of Santa Roza off the same coast. It is now in cultivation.

Lilies Diseased.—Mr. Noy, of Brentford, sent some Lilies:

Some grown on land heavily manured with sewerage matter and ashes; others on land which had not been manured for several years, being a very light soil. They were attacked with a species of *Peronospora*, allied to the Potato disease; so possibly a treatment similar to that for Potatoes might be advantageous.

Tulip with Axillary Flower.—Mr. Townell, of Heaton, Newcastle-on-Tyne, sent a specimen of the Tulip "*Proserpine*," in which an additional small flower sprang from the axil of a leaf on the scape. It is not a common production, but similar growths occasionally occur.

Cineraria Crosses.—Messrs. James & Son, of Farnham Royal, sent several fine grown plants, which they had raised (1) between *Cineraria cruenta* crossed with garden forms, and four plants (2, 3, 4, 5), resulting from this; also (1) again crossed with *C. Heritieri* (6); also this last true species crossed with the first named (1). It had white flowers, with pink tips to the petals. Of the four plants, numbered 2, 3, 4, 5, No. 2 had foliage more resembling that of *C. cruenta*, but 3, 4, and 5 that of *C. Heritieri*, while three had a white ray and pink disk; 5 had both ray and disk of a crimson colour.

SCIENTIFIC COMMITTEE, MAY 11, 1897.

Dr. M. T. MASTERS, F.R.S., in the Chair, and seven members present.

Weevils on Fruit Trees.—Mr. Rbt. Smith, of Shrewsbury, forwarded some living specimens received by him from Mr. J. Jones, Chelmick Pools, Church Stretton. They were described as attacking Plum and Apple grafts, Roses and Raspberry buds. They proved to be *Otiorrhynchus pisipes*. The trees and bushes might be sprayed, though a better plan is to shake the boughs over a large sheet of paper, in which they can be caught and then destroyed.

Birch Branch with Phytoptus.—Dr. Masters showed specimens illustrating the early stage of the attack on boughs by this insect. It is not often the commencement of the so-called "Witch Brooms" can be detected as in this instance.

Abies bracteata.—He also exhibited sprays of this handsome

tree, remarkable for the silvery under surface of the leaves, which are about 3 inches in length. It bears large male catkins, and elongated pointed buds. It is a native of S. California. It is remarkable that it fails to flower on the Atlantic side of N. America.

A. Menziesii.—He also showed a bough of this splendid timber tree from Vancouver.

Petalless Apples.—Flowering shoots of the Ecklinville (Seedling) Apple were received, remarkable for having no petals. They were sent from the Glewstone Gardens, Ross. There were 600 bushes of twelve years' growth, all being similarly affected. No particular cause could be suggested.

Double Narcissus.—Dr. Masters showed a single and double flower of a *N. incomparabilis*, of a somewhat novel character. The perianth consisted of twelve pieces regularly arranged in "threes." The short cup-shaped corona as well as the stamens were totally absent; but the styles above the tube were free and petaloid, suggesting the normal condition in an Iris.

Sclerotia (?).—Mr. M. Taylor, of the Gardens, Penbidw Hall, Nannerch, sent some remarkable specimens of a fungus consisting of large branching lumps, which appeared in a Mushroom bed. They were forwarded to Kew for investigation.

Improved Method of Grafting.—Mr. Robt. Smith, of Bradwell Villas, Bishop Street, Shrewsbury, sent a number of specimens of grafts, illustrating a new method. This being, that in preparing the scion, while one "tongue" is inserted as usual, the opposite half of the scion is carried over the flat top or "crown," and inserted on the opposite side, or two grafts may be thus inserted on opposite sides of the stem, the result being, as shown in the specimens sent, that the summit is completely covered in with new growth. This was seen in small specimens of whip-grafting, but none were sent to show how far large crowns would become covered over. Another advantage arose from the new method of preventing loss of grafts by wind breakage, for it thus gave a better and stronger union. It was thought by Mr. Douglas that it was a decided improvement upon the old method, as long as the scion and stock were of the same size; but further information was desirable as to the success when the surface of the stock much exceeded that of the scion. (Figs. 22 to 26, pages liii-lv.)

Double White Auricula.—Mr. R. Dean sent a plant, which was the result of fifteen years' selection from a single white variety; the petals were not of a pure white, but slightly yellowish-green tint.

FRUIT AND VEGETABLE COMMITTEE.

JANUARY 12, 1897.

PHILIP CROWLEY, Esq., in the Chair, and twenty-four members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Messrs. Bunyard & Co., Maidstone, for 100 dishes of Apples, and 10 dishes of Pears.

Silver-gilt Banksian Medal.

To Messrs. James Veitch & Sons, Chelsea, for a collection of Apples and Pears.

Silver Banksian Medal.

To Messrs. Cannell & Son, Swanley, for a collection of Potatos.

Award of Merit.

To Apple 'Belle de Boskoop' (votes, unanimous), from Messrs. James Veitch & Sons, Chelsea. Both in flavour and appearance this new Apple reminds one of 'Hambledon deux ans.' Of good size and quality, flattish, russety, and tender in the flesh.

Cultural Commendation.

To Mr. Wythes, gardener to Earl Percy, Syon House, Brentford, for Tomato 'Syon Prolific,' being a cross between 'Duke of York' and 'Ham Green.'

Other Exhibits :—

W. H. Evans, Esq., Ford Abbey, Chard (gr. Mr. J. Crook),

sent a dish of 'Wellington' Apples (syn. Dumelow's Seedling). Probably the finest coloured dish of this variety ever seen.

The Hon. Henry Butler, Nydd Hall, Ripley, sent Apple 'September Beauty.'

Messrs. Young & Dobinson, Stevenage, sent 24 dishes of Potatos.

Lady Emily Foley, Stoke Edith Park (gr. Mr. Ward), sent a seedling Apple, very pretty, but quite past its best.

Mr. G. Fulford, Damerham, sent a dish of Pear 'Doyenné d'Hiver,' which is one of the many names of the well-known 'Easter Beurré.' The fruits were of very large size, and delicious in both quality and flavour.

Messrs. James Veitch & Sons sent Apple 'Fraise d'Hoffinger,' a very pretty fruit indeed, and of good quality, but wanting in flavour. Also Apple 'Standard Bearer,' which received an Award of Merit in 1893. The fruits were of good size, conical, with a slightly rough, greeny yellow skin, and firm yellow flesh; of good quality, and very fair flavour.

Mr. Henry Sheppard, Bedford, sent under name 'Sheppard's Nonpareil,' a dish of Apples which the Committee considered to be 'Scarlet Nonpareil.'

Lord Suffield, Gunton Park, Norwich (gr. Mr. Allan), sent for correct name a dish of Pears which Mr. Allan had obtained under the name of 'Crassane,' by grafts from a tree fifty years old at Blickling. The variety was quite unknown to the Committee, but the fruits resembled what one would expect from a cross between 'Hacon's Incomparable' and 'Winter Nelis.'

Mr. John Wright exhibited some preserved Dates sent to him by Lionel Sandars, Esq., one of her Majesty's judges in Egypt. Writing from Ramleh, Egypt, Mr. Sandars says:—"I am sending something which I think you have never tasted before—preserved Dates—which should be eaten at dessert like ginger. I am always surprised that people in England know nothing about them, and cannot help thinking it would pay someone to import them. They improve by keeping."

This being the last meeting of the Season 1896-7, the Chairman said that he wished in his own name, no less than in that of the Council, to thank all the members most sincerely for the great pains they had taken, and the attention they had bestowed on the work that had come before them.

A hearty vote of thanks was subsequently passed by acclamation to the Chairman and the Secretary for the impartial, courteous, and efficient manner in which they had performed their duties towards the Committee.

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 9, 1897.

PHILIP CROWLEY, Esq., in the Chair, and twenty-four members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Messrs. Cheal & Son, Crawley, for 60 dishes of Apples.

Silver Knightian Medal.

To Messrs. Rivers & Son, Sawbridgeworth, for 30 dishes of Apples, and a large number of Oranges of different varieties.

Award of Merit.

To Apple 'Prince Edward' (votes, 12 for), from Messrs. Rivers & Son. Judging simply by its appearance, this new Apple might very well be a cross between 'Cox's Pomona' and 'Cellini.' It is said to be a very good bearer, and is of a nice, brisk flavour, and wonderfully soft and melting.

Cultural Commendation.

To Mr. G. Harvey, gardener to Major Thornhill, Stanton Hall, Bakewell, for two plates of exceedingly fine Lemons grown on the back wall of a vinery.

Other Exhibits.

Messrs. Rivers & Son sent Apple 'Carmenal'; flattish and much striped at the base. Also Apple 'St. Martin's'; a very sweet, pleasant, and soft-eating variety, dark in colour, and conical in shape. It received an Award of Merit on November 24, 1896.

Messrs. Young & Co., Stevenage, sent 36 varieties of Potatos.

James Watson, Esq., sent Apple 'Bramley's Seedling.'

FRUIT AND VEGETABLE COMMITTEE, MARCH 9, 1897.

Mr. GEORGE BUNYARD in the Chair, and twenty members present.

Awards Recommended :—*Silver Knightian Medal.*

To E. Dresden, Esq. (gr. Mr. J. C. Tallack), Livermere Park, Bury St. Edmunds, for 30 dishes of Apples and Pears.

Silver Banksian Medal.

To C. J. Massey, Esq. (gr. Mr. James Day), Garliestown, Wigtownshire, for a collection of Apples.

To Mrs. Wingfield (gr. Mr. Empson), Ampthill, for a collection of Fruit and Vegetables.

Cultural Commendation.

To Mr. Wythes, gardener to Earl Percy, Syon House, for Asparagus forced in the open air by a simple covering of leaves.

To Mr. Wythes, for Chicory forced in the same way.

To Mr. Hudson, gardener to Messrs. de Rothschild, Gunnersbury House, for a box of Apples 'Newton Wonder.'

Other Exhibits.

R. R. Taylor, Esq., Westbury, Wilts, sent some specimens of grafting and budding, in which a short length of indiarubber tube took the place of grafting wax or any other covering material.

Mr. W. J. Brown & Co., Stamford, sent Apple 'Lavender's Seedling' (see November 10, 1896)—quite of the character of 'Wyken Pippin,' and possibly a cross between it and 'Blenheim Orange.' An Award of Merit was proposed, 7 voting for it, and 10 against.

Mr. John Watkins sent his new Apple 'Lord Hindlip' to show how well it keeps. It was very fine and solid, and still of very good flavour.

Mr. Geo. Lovelock, Normanton Park, Stamford, sent Apple 'Diamond Jubilee'—very like 'Royal Somerset' in appearance, and with exactly the flavour of 'Wellington.'

Captain Carstairs (gr. Mr. Ross) sent Apple 'Mottled Russett'—of very fair flavour, but somewhat lacking in quality.

Messrs. Lane & Son, Berkhamsted, sent Apple 'St. John's Seedling,' which too much resembled 'Hormead Pearmain.'

Mr. E. Holder, Grosvenor Cottage, Bath, sent a seedling Apple somewhat in the way of 'Court of Wick.' It was crisp, juicy, and of fair flavour, but had possibly been gathered too soon.

FRUIT AND VEGETABLE COMMITTEE, MARCH 23, 1897.

PHILIP CROWLEY, Esq., in the Chair, and eighteen members present.

After the minutes of the last meeting had been read the Chairman called on the Secretary, the Rev. W. Wilks, to move a resolution. The Secretary, rising, said:—"Mr. Chairman and gentlemen of the Fruit Committee,—We have all of us, I am sure, come here to-day with very contradictory feelings. We one and all want to get up and bear testimony to the great loss which this Committee has sustained since last we met; and yet we one and all shrink from doing so from a feeling (which I share with everyone of you) that there is not one among us capable of doing justice to the theme. In one sense, then, I shrink from the subject as from a task too hard for me to perform—a burden I am unequal to bear; whilst, in another sense, I feel that the duty which the Chairman has deputed to me is the greatest honour he could confer upon me. Gentlemen, we have lost one whom all who knew him at all intimately loved sincerely; whom all at this table revered; whom every English gardener honoured; whom all pomologists in every country of the world looked up to and respected as the chief authority on fruit—our dear friend and coadjutor Dr. Hogg—the founder of this Committee—who has been taken from us. But what a splendid work and what a grand example he has left behind! Seldom has it been given to a man to reduce to such (comparatively speaking) perfect order such an absolute chaos as he found British fruit description and nomenclature. The greatness of his work in this respect is not yet fully realised. A Scotchman by birth, and like so many Scotchmen, of untiring energy and dogged perseverance; a man of transparent honesty of purpose and of blunt outspoken truth-

fulness; he hated hypocrisy and sham, whilst his heart was simply overflowing with kindness and gentleness and sympathy. He was not like any other man. He had a very marked individuality; a sort of solidity and terseness of expression, both in word and manner, which was reflected in the picturesque ruggedness of his outward form, reminding one not a little of the massive, open, wind-swept, heather-clad hills of his own Scots' land. No one who ever saw him could possibly forget him, or mistake him for any other; and no one who really knew him but now feels he has one staunch and true friend the less. Gentlemen, we cannot but mourn for Dr. Hogg; but even whilst we mourn let us not forget to thank God truly for the man, and for sparing him to us for almost fourscore years. I beg to propose the following resolution:—‘The Fruit Committee of the Royal Horticultural Society desire to record upon their minutes the profound estimation in which they hold the life and work of the late Dr. Hogg. The Committee recognise with gratitude that Dr. Hogg’s life was one of unceasing benefit to the best interests, not only of British pomology, but also of the pomology of the whole world. Wherever fruit is grown for the benefit of mankind, there for generations yet unborn will the name of Dr. Hogg be known and honoured. The Committee can find no words to express the greatness of the loss which they in common with all English-speaking fruit growers have sustained by the death of one whom all who knew him held so dear; they are forced to content themselves with placing upon record their deep sense of the inestimable privilege they have enjoyed in being associated on this Committee for so many years with so kindly and eminent a man.’” The members uncovered during Mr. Wilks’ remarks, and the resolution having been seconded by T. Francis Rivers, Esq., was accepted unanimously in mournful silence.

Awards Recommended:—

Award of Merit.

To Apple ‘King’s Acre Pippin’ (votes, 12 for), from the English Fruit Co., Hereford, supposed to be a cross between the ‘Sturmer’ and ‘Ribston’ Pippins. Fruit medium sized, oblate, slightly angular, heavily covered with russet, especially on the upper side, lower side clear; stalk thin, half an inch long,

deeply inserted; eye partly open, set in a shallow, puckered cavity; flesh greenish yellow, tender, sweet, and with somewhat the flavour of 'Sturmer,' but intensified.

Other Exhibits.

The English Fruit Co. also sent a dish of very brilliantly coloured Apples, under the name of 'Ecklinville.' The Committee were sure it was not 'Ecklinville,' but were unable to recognise it.

W. J. Clarke, Esq., Binbrook, Market Rasen, sent three apples for name; one was recognised as 'French Crab,' another was considered to be a local seedling of little value, but the third was a small but exceedingly firm, crisp, juicy, dessert apple, which for the end of March was excellent.

FRUIT AND VEGETABLE COMMITTEE, APRIL 13, 1897.

PHILIP CROWLEY, Esq., in the Chair, and seventeen members present.

Awards Recommended:—

Silver-gilt Knightian Medal.

To Earl Percy (gr. Mr. Wythes), Syon House, for a beautiful collection of early Vegetables with Figs and Strawberries.

Silver Knightian Medal.

To Mrs. Wingfield (gr. Mr. Empson), Amptill, for a collection of Vegetables.

Silver Banksian Medal.

To the Duke of Rutland (gr. Mr. Divers), for a collection of Apples.

Cultural Commendation.

To Mr. Farr, gardener to A. Pears, Esq., Isleworth, for a basket of new and old Grapes.

Other Exhibits.

Mr. Harris sent from Roseville, Jersey, five enormous Pears under name 'Belle de Jersey,' which the Committee considered to be 'Uvedale's St. Germain.'

From W. H. Evans, Esq. (gr. Mr. Crook), Forde Abbey,

came dishes of 'Dumelow's Seedling' and 'Sturmer' Apples and an Onion named 'Forde Long-keeping.'

Sir Trevor Lawrence, Bart. (gr. Mr. Bain), Burford, sent a bundle of 'Anserine Bon Henri.' It consists of the young shoots of a plant *Chenopodium Bonus Henricus*, which grows wild in many parts of England, and is extensively cultivated by cottagers in Lincolnshire and elsewhere under the various names of 'Perennial Spinach,' 'Good King Henry,' 'Lincolnshire Mercury,' 'Algood,' &c. It is perfectly hardy, and is said to be very palatable as a first early Spring Vegetable.

FRUIT AND VEGETABLE COMMITTEE, APRIL 21, 1897, AT
CHISWICK.

PHILIP CROWLEY, Esq., in the Chair, and thirteen members
present.

Awards Recommended :—

First Class Certificate.

To Radish 'Deep Scarlet Olive Shaped Extra Early' (votes, unanimous), from Messrs. Vilmorin, Quai de la Mégisserie, Paris.

To Radish 'White Olive Shaped Extra Early' (votes, unanimous), also from Messrs. Vilmorin.

These two radishes were proved to be the earliest of all and were ready for use in five weeks from the date of sowing.

Award of Merit.

To French Bean 'Ne plus ultra' (votes, unanimous), from Messrs. James Veitch & Sons, Chelsea, and Messrs. Watkins & Simpson, London.

To French Bean 'Early Favourite' (votes, unanimous), from Messrs. James Veitch & Sons.

To French Bean 'Improved Mohawk' (votes, unanimous), from Mr. Geo. Wythes, Syon House Gardens.

To French Bean 'Emperor William' (votes, 9 for, 4 against), from Messrs. Benary & Co., Erfurt.

To French Bean 'Golden Wax Pod' (votes, unanimous), from Messrs. Barr & Son, Covent Garden.

The above Beans were found to be the best for forcing, together with 'Osborn's Forcing,' which had received F.C.C. in 1873. For Report on Forcing Beans see page 139.

FRUIT AND VEGETABLE COMMITTEE, APRIL 27, 1897.

PHILIP CROWLEY, Esq., in the Chair, and sixteen members present.

Awards Recommended:—

Silver Banksian Medal.

To Earl Percy, Syon House (gr. Mr. Wythes), for a collection of vegetables and fruit.

[The Council on the report of the Chairman awarded a Silver Knightian Medal to this collection.]

Award of Merit.

To Dessert Apple 'Easter Orange' (votes, unanimous), from Messrs. Hillier & Son, Winchester. For the time of year an Apple of very good flavour and of tender flesh, not unlike 'Cox's Orange,' but more distinctly conical and more evenly streaked with crimson and orange colour all over. Stalk very short and deeply inserted. Eye very like that of 'Cox's Orange.'

Other Exhibits.

From the Royal Gardens, Windsor, Mr. Owen Thomas sent specimens of his new yellow Tomato 'Royal Windsor,' which received an Award of Merit, August 5, 1896. It is a cross between 'Golden Queen' and 'Frogmore Selected.' It is a fruit of excellent flavour, and though somewhat like 'Blenheim Orange' in appearance was considered to be both larger and better. Mr. Thomas also sent a new Strawberry 'Sir Trevor,' a cross between 'La grosse Sucrée' and 'Royal Sovereign.' The variety did not seem to be as yet quite fixed, as some of the fruits were of pale flesh with indented seeds and some dark-fleshed with prominent seeds. All the fruits were very handsome, and the pale-fleshed ones of fine flavour like 'Royal Sovereign.'

Messrs. Hurst & Sons sent a fine Broccoli under name 'Hurst's Early April.'

Mr. M. Russell, Farnborough, sent a new Strawberry 'Early Giant,' a cross between 'Paxton' and 'Noble.' Fruits very large and of fine colour but terribly rugose and irregular in form, and not overburdened with flavour.

Earl Percy (gr. Mr. Wythes) sent both old and new Grapes—'Lady Downes,' still plump and good, and 'Black Hamburg' and 'Foster's Seedling' from young pot vines.

FRUIT AND VEGETABLE COMMITTEE, MAY 11, 1897.

PHILIP CROWLEY, Esq., in the Chair, and twenty-two members present.

Awards Recommended :—

Silver Knightian Medal.

To Mrs. Wingfield (gr. Mr. Empson), Amptill House, for a collection of Vegetables.

Cultural Commendation.

To Mr. Wythes, gardener to Earl Percy, Syon House, for Figs 'Brown Turkey,' 'St. John's,' and 'Violet Sipor.'

Other Exhibits.

J. Rylands, Esq. (gr. Mr. Backham), Longford House, Ryde, sent a Cucumber 'Longford Hall,' raised from 'Rochford's Market' × 'Improved Telegraph.'

R. Burrell, Esq. (gr. Mr. Bishop), Westley Hall, Bury St. Edmunds, sent an unnamed Melon raised from 'Westley Hall' × 'High Cross Hybrid.' The fruit sent was a very large one, white fleshed, very deep in the flesh, excellent flavour for the time of year. An Award of Merit was proposed but lost, 7 voting for and 11 against. The Committee considered that so early in the season probably but scant justice had been done to the variety and desired to see it again, requesting that an ordinary-sized fruit should be sent.

Mr. M. Russell sent two large boxes of the same Strawberry which he sent to the last meeting.

R. P. Jenkins, Esq. (gr. Mr. Turnbull), Beachey Lodge, Gloucester, sent some excellent and very well grown Asparagus, from a bed which was said to be 100 years old.

The Duke of Northumberland (gr. Mr. Leach), Albury Park, sent an Apple 'Miller's Seedling' of excellent flavour, but rather hard and tough as to quality.

Earl Percy (gr. Mr. Wythes), Syon House, sent a box of 'Hales Early' Peach.

Mr. Robert Smith, Bishop Street, Shrewsbury, sent specimens

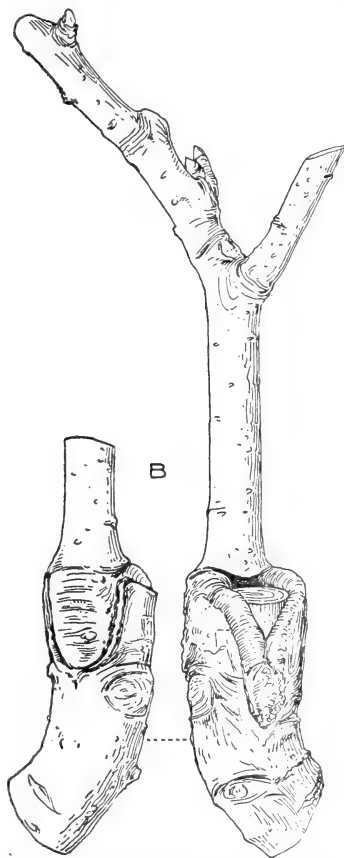


FIG. 22.—OLD AND DEFECTIVE METHOD.

of his system of grafting, which the accompanying woodcuts, kindly lent by the *Gardeners' Chronicle*, will best explain. It was considered excellent when the wood to be grafted was of any age. (See figs. 22 to 26.)

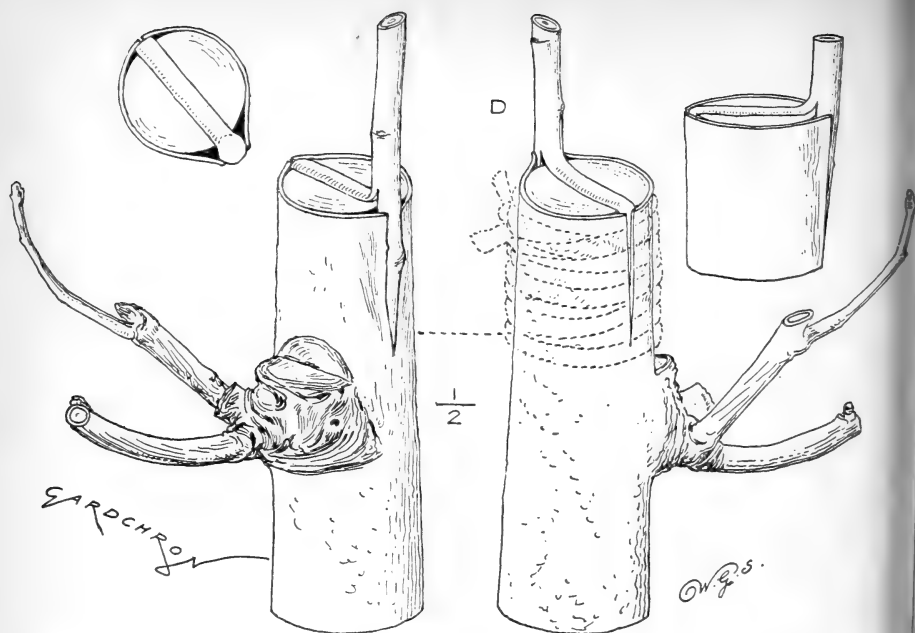


FIG. 23.—NEW METHOD, SHOWING GRAFT IN POSITION BEFORE IT IS WAXED.

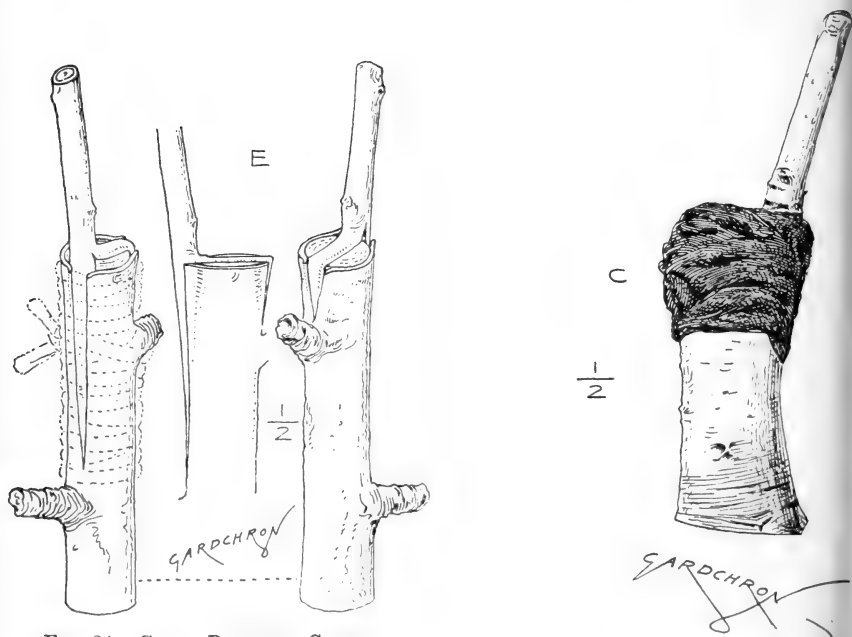


FIG. 24.—SMALL BRANCHES GRAFTED AND READY FOR WAXING.

FIG. 25.—NEW METHOD, GRAFT COMPLETE.



FIG. 26.—NEW METHOD, SHOWING GRAFT AFTER FIRST YEAR'S GROWTH.

FRUIT AND VEGETABLE COMMITTEE, MAY 26, 1897. TEMPLE GARDENS.

PHILIP CROWLEY, Esq., in the Chair, and fourteen members present.

Awards Recommended:—[For other Awards see p. xvii.]

First Class Certificate.

To Tomato 'Golden Jubilee' (votes, unanimous), from Mr. Owen Thomas, gardener to Her Majesty at Windsor. This Tomato received an Award of Merit under the name of 'Royal Windsor' on August 5, 1896 (see Vol. xx., pt. 2, p. cxxxiv). At Mr. Thomas's request the Committee, in voting F.C.C., also changed the name to 'Golden Jubilee.' This is probably the finest Tomato, for eating as a fruit, that has ever been raised, its flavour being delicious. [See p. li.]

Award of Merit.

To Melon 'Diamond Jubilee' (votes, 9 for), from Hon. G. M. Fortescue (gr. Mr. Herrin), Dropmore. A round, scarlet fleshed fruit, well netted, and of excellent flavour and very sweet; the result of a cross between 'La Favorite' and an unnamed seedling.

Other Exhibits. [See also p. xvii.]

W. H. Evans, Esq. (gr. Mr. Crook), Forde Abbey, sent a Strawberry 'Forde Abbey Seedling' which was considered too like 'Royal Sovereign' to merit an Award.

Messrs. Laxton, Bedford, sent a Strawberry 'Early Laxton,' a cross between 'Mr. Ruskin' and 'Royal Sovereign.' It was desired that it might be tried at Chiswick.

Mr. Owen Thomas sent Cauliflower 'Thomas' Early,' which was considered too near to 'Early Dwarf Erfurt.'

Mr. Palmer, Andover, sent some remarkably fine 'Royal Sovereign' Strawberries, which had been grown as follows:—
"The runners were layered in the open ground on an allotment and lifted early in August and planted in another allotment; but having put up a house for Tomatos it occurred to me that I might turn the Strawberries to a good account if they were

potted and placed on the shelves. So I had them lifted barely six weeks ago, with a good ball, potted in ordinary mould mixed with a little road grit, bone meal, and vine manure. Since they commenced to swell I have watered three times with a little sulphate of ammonia; the crop now is enormous and is a splendid sight."

A. Henderson, Esq. (gr. Mr. Meades), Buscot Park, Faringdon, sent a very interesting group of Melons.

Lord Braybrooke (gr. Mr. Vert), Audley End, sent a Melon 'Audley End Favourite.'

FLORAL COMMITTEE.

FLORAL COMMITTEE, JANUARY 12, 1897.

W. MARSHALL, Esq., in the Chair, and twenty-one members present.

Awards Recommended :—

Silver Flora Medal.

To Major Joicey, Sunningdale Park, Ascot (gr. Mr. Thorne), for Cyclamen.

To N. L. Cohen, Esq., Englefield Green, Surrey (gr. Mr. Sturt), for Freesias.

To Messrs. Cannell, Swanley, for Primulas.

To Mr. John May, Twickenham, for Cyclamen.

Silver Banksian Medal.

To Messrs. Cutbush, Highgate, for a group of Cyclamen, &c.

Award of Merit.

To strain of Cyclamen papilio (votes, unanimous), from Mr. De Langhe, Rue de Constantinople, Brussels. A strain with large broad fimbriated petals.

Botanical Certificate.

To Senecio Seedlings (votes, unanimous), the result of crossing Senecio multiflora with the garden Cineraria, from R. I. Lynch, Esq., Botanic Gardens, Cambridge.

Other Exhibits.

J. Bradshaw, Esq., Southgate, sent a well-flowered plant of *Veltheimia viridifolia*.

J. W. Thompson, Esq., Coniston, sent a plant of *Nephrolepis nanus*. The Committee asked to see it again.

Messrs. William Paul, Waltham Cross, exhibited a plant of *Cratægus Carrierei* bearing a profusion of yellow fruits. The Committee asked to see the plant when in flower.

From Mr. Crook, Forde Abbey, came a few *Cyclamen*.

Messrs. Cripps, Tunbridge Wells, exhibited the winter-flowering *Hamamelis arborea*, and Violet 'Admiral Avellan.' The Committee asked to see the Violet again.

Chrysanthemums were exhibited by :—

- (1) Earl of Jersey, Osterley Park (gr. Mr. Hawkes).
- (2) The Hon. G. M. Fortescue, Dropmore (gr. Mr. Herrin).
- (3) Mr. Owen, Maidenhead.
- (4) Mr. Wells, Redhill.

FLORAL COMMITTEE, FEBRUARY 9, 1897.

W. MARSHALL, Esq., in the Chair, and twenty-six members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Cannell, Swanley, for *Primulas*.

Silver Flora Medal.

To Messrs. Low, Clapton, for *Cyclamen*.

To Messrs. Peed, West Norwood, for a group of foliage and flowering plants.

To Mr. C. Turner, Slough, for *Cyclamen*.

Silver Banksian Medal.

To Earl Percy, Syon House, Brentford (gr. Mr. Wythes), for a group of forced plants—*Staphylleas*, *Azaleas*, *Prunus sinensis* fl. pl., *Tulips*, and *Hyacinths*.

To Messrs. Laing, Forest Hill, for a group of *Dracænas*, *Ferns*, *Palms*, and *Orchids*.

Bronze Flora Medal.

To the Baroness Burdett Coutts, Holly Lodge (gr. Mr. Willard), for Begonia 'Gloire de Sceaux.'

To Messrs. Williams, Holloway, for Azalea Mollis.

Bronze Banksian Medal.

To Purnell Purnell, Esq., Woodlands, Streatham, for Narcissi.

To Mr. Ware, Tottenham, for hardy bulbous plants.

To Messrs. Barr, Covent Garden, for hardy plants.

First-class Certificate.

To Lapageria rosea 'Warnham Court variety' (votes, unanimous), from C. J. Lucas, Esq., Warnham Court. A very handsome and free-flowering variety. The large flowers are rosy-red mottled with greyish white.

To Iris Bakeriana (votes, unanimous), from Messrs. Wallace, Colchester. A dwarf-growing species of much beauty. Standards pale blue; falls whitish-yellow blotched with violet and margined with deep blue. Very fragrant.

Award of Merit.

To Violet 'Admiral Avellan' (votes, 19 for), from Messrs. Cripps, Tunbridge Wells. A sweet-scented variety with reddish purple flowers and vigorous deep green foliage.

Highly Commended.

Exhibit of flowers, dried without pressing, in such a way that they appeared almost as if recently gathered (votes, unanimous), from The Floral Preservation Company, 14 Colman Street, E.C.

Other Exhibits.

Sir Trevor Lawrence, Bart., Burford (gr. Mr. Bain), sent Anthurium 'Perfection.'

From Sir J. W. Ramsden, Bart., Byram, Ferrybridge (gr. Mr. Taylor), came an unnamed seedling Calla.

Mr. Crook, Forde Abbey, sent Violets and Primroses.

Messrs. James Veitch, Chelsea, sent a group of hardy flowering shrubs.

Messrs. Paul & Son, Cheshunt, sent Lilac 'Madame Lemoine' to show its adaptability for forcing.

From Mr. Owen, Maidenhead, came two varieties of Primulas.

Messrs. Young, Stevenage, sent Lilies of the Valley.

Messrs. Sander, St. Albans, sent Utricularia Forgetiana.

FLORAL COMMITTEE, MARCH 9, 1897.

W. MARSHALL, Esq., in the Chair, and twenty-six members present.

Awards Recommended :—*Silver Gilt Flora Medal.*

To Messrs. William Paul, Waltham Cross, for a group of Camellias and Roses.

Silver Gilt Banksian Medal.

To Messrs. James Veitch, Chelsea, for a group of Primulas and Hippeastrums.

To Messrs. James & Son, Farnham Royal, for Cinerarias.

To the St. George's Nursery Company, Hanwell, for Cyclamen.

Silver Flora Medal.

To Mr. Ware, Tottenham, for a group of Narcissi and Alpine plants.

Silver Banksian Medal.

To the Hon. W. F. D. Smith, M.P., Greenlands, Henley-on-Thames (gr. Mr. Perkins), for Hippeastrums.

To Mrs. Whitbourn, Great Gearies (gr. Mr. Douglas), for a group of Cinerarias.

To Mrs. Crawford, Gatton Lodge, Reigate (gr. Mr. Slogrove), for Cyclamen.

To Messrs. Laing, Forest Hill, for a group of foliage and flowering plants.

To Messrs. Balchin, Hassocks, for Boronias and Primulas.

To Messrs. Cutbush, Highgate, for Carnations, Ericas, and hardy shrubs in flower.

To Messrs. Barr, Covent Garden, for a group of hardy flowers.

To Mr. John May, Twickenham, for Cyclamen.

To Messrs. Peed, West Norwood, for Azaleas, Boronias, Cyclamen, and hardy shrubs in flower.

To Mr. Mount, Canterbury, for Roses.

Bronze Flora Medal.

To Major the Hon. H. C. Legge, Fulmer, Slough (gr. Mr. Mowbray), for Freesias.

Bronze Banksian Medal.

To Messrs. Cannell, Swanley, for Primulas and Begonias.

To Messrs. Paul & Son, Cheshunt, for a group of Alpine plants, Roses, and Daphnes.

To Messrs. Cuthbert, Southgate, for Azalea mollis.

First Class Certificate.

To *Cotoneaster horizontalis* (votes, unanimous), from Messrs. Paul & Son, Cheshunt. A freely branched variety of dwarf habit suitable for growing on the rockery. Its small leaves assume many shades of chocolate and crimson in the autumn. It also bears a profusion of bright red berries.

Award of Merit.

To *Primula obconica rosea* (votes, unanimous), from Mr. Ware, Tottenham. A form with bright rosy-pink flowers.

To Strain of *Cyclamen grandiflora alba* (votes, unanimous), from the St. George's Nursery Company, Hanwell. Large pure white flowers of great substance.

To *Corylopsis spicata* (votes, 8 for, 7 against), from Messrs. James Veitch, Chelsea. An early flowering deciduous shrub. Its yellowish green flowers, with conspicuous crimson anthers, are borne in short racemes.

To *Lomaria ciliata grandis* (votes, 12 for), from Mr. H. B. May, Edmonton. A vigorous grower, of good habit, with bright green fronds; the pinnæ broad and wavy at the margins.

To *Chionodoxa Luciliæ alba* (votes, 15 for, 1 against), from Messrs. Barr, Covent Garden. A white form of this well-known spring flower.

Other Exhibits.

H. J. Elwes, Esq., Colesborne, Andoversford, sent a magnificent spike of *Lilium Thomsonianum*.

Mrs. Macalister, Bampton, Devon, sent a specimen of *Gerbera Jamesoni*.

From F. W. Moore, Esq., Glasnevin, came a very, interesting collection of Hellebores, in which were several unnamed seedlings of much promise.

J. B. Arbuthnot, Esq., Scots Guards, Wellington Barracks, Westminster, sent an unnamed Calla.

J. Higgins, Esq., Wimborne, exhibited three plants of an unnamed Violet. The Committee considered it identical with 'Lady Hume Campbell.'

J. J. Rogers, Esq., Chislehurst, sent Hellebores.

Mr. Archer Hind, Fishacre, North Devon, also sent Hellebores.

Mrs. Charrington, Reigate, exhibited a flowering branch of *Melia floribunda*.

Mr. Crump, Madresfield Court, sent specimens of zinc labels.

Mr. Isaac House, Westbury-on-Trym, exhibited a new Violet 'California.'

Mr. John Green, Dereham, sent a Primrose 'Blue King.'

Messrs. Low, Clapton, exhibited *Epacris*.

Messrs. Sander, St. Albans, sent *Utricularia Forgetiana*.

Messrs. R. Veitch, Exeter, sent *Viola sulphurea* and *Prunus Myrobolano* fl. pl.

Mr. C. Turner, Slough, sent Violets.

Prizes.

Class 3.—A group of twelve plants of Lenten Roses (*Helleborus orientalis* and its varieties), containing at least six distinct varieties. The plants, which will be judged mainly by their fine growth and abundant blossom, must have been grown entirely in the open air. To be shown in mossed bundles, baskets, pots, or tubs. Open. Prizes kindly given by W. Robinson, Esq. First prize, £7. 7s., to Messrs. George Paul & Son, Cheshunt. Second prize, £3. 3s., to Messrs. Barr & Son, Covent Garden.

FLORAL COMMITTEE, MARCH 23, 1897.

W. MARSHALL, Esq., in the Chair, and twenty-five members present.

Awards Recommended:—*Silver Flora Medal.*

To Messrs. Cutbush, Highgate, for Hyacinths, Tulips, and hardy shrubs.

To Messrs. Kerr, Grassendale, Liverpool, for Hippeastrums.

Silver Flora Medal.

To Mrs. Abbot, South Villa, Regent's Park, N. (gr. Mr. Kelf), for a group of Narcissus, Hyacinths, Tulips, and Lily-of-the-Valley.

To Mr. Mount, Canterbury, for Roses.

To Messrs. Laing, Forest Hill, for foliage and flowering plants.

To Mr. H. B. May, Upper Edmonton, for Roses and Clematis.

To the Church Road Nursery Co., Hanwell, for Cyclamen.

Silver Banksian Medal.

To Henry Tate, Esq., Park Hill, Streatham Common (gr. Mr. Howe), for bulbous plants.

To Messrs. Peed, West Norwood, for a group of plants.

To Messrs. Paul & Son, Cheshunt, for a collection of Alpine plants and Rhododendrons.

To Messrs. Cannell, Swanley, for Begonias.

To Messrs. William Paul & Son, Waltham Cross, for Camellias and Roses.

Bronze Banksian Medal.

To Purnell Purnell, Esq., Woodlands, Streatham Hill, for Primulas.

To Lord Wantage, Lockinge Park (gr. Mr. Fyfe), for beautiful cuttings of Camellia reticulata and Rose 'Fortune's Yellow.'

To Messrs. Cuthbert, Southgate, for Tulips.

First Class Certificate.

To Tulipa Kaufmanniana (votes, unanimous), from Messrs.



FIG. 27.—TULIPA KAUFMANNIANA. (*Gardeners' Chronicle*.)

Barr, Covent Garden, and Messrs. Wallace, Colchester. A very handsome and early flowering species. The large flowers are borne on stout stems; colour creamy white, the lower portion being deep golden yellow. Externally the colour is bright carmine. (Fig. 27.)

Award of Merit.

To *Clivia* 'Charles Vermeire' (votes, unanimous), from J. T. Bennett-Poë, Esq., Holmewood, Cheshunt (gr. Mr. Downes). Orange scarlet flowers with a yellow centre borne in immense trusses.

To *Anthurium scherzerianum* 'Geant Sanglant' (votes, unanimous), from Messrs. Linden, Brussels. A variety with large roundly-cordate bright red spathes.

To *Erythronium Nuttallianum* (votes, unanimous), from Messrs. Barr and Messrs. Wallace. Plant of dwarf habit bearing golden yellow flowers.

To *Disporum Leschenaultianum variegatum* (votes, unanimous), from Messrs. James Veitch, Chelsea. The lanceolate leaves of this handsome Liliaceous plant are soft green, striped and margined with silvery white.

To *Hippeastrum* 'Pera' (votes, 14 for), from Messrs. James Veitch. Flowers large and of great substance; colour orange scarlet feathered with white.

To *Polyanthus* 'Woodside Red' (votes, unanimous), from Mr. R. Dean, Ealing. Flowers dull crimson laced with golden yellow.

To *Rose* 'Antoine Rivoire' (H. T.) (votes, unanimous), from Mr. C. Turner, Slough. Flowers creamy-blush.

Botanical Certificate.

To *Fritillaria alpina* (votes, 16 for), from Messrs. Barr.

Other Exhibits.

Sir Trevor Lawrence, Bart, Burford (gr. Mr. Bain), sent a beautiful specimen of *Eucharyles hybrida*. The Committee asked to see this again.

From the Duke of Marlborough, Blenheim, Woodstock (gr. Mr. Whillans), came two Carnations.

Captain Holford, Tetbury, Gloucester (gr. Mr. Chapman), sent four varieties of *Hippeastrums*.

Mr. C. Toryford, Totnes, South Devon, sent an unnamed seedling Fuchsia.

Messrs. Gordon, Edinburgh, exhibited Alpine plants.

Messrs. Sander, St. Albans, again sent *Utricularia Forgetiana*.

From Messrs. William Paul, Waltham Cross, came two Roses 'Souvenir de Madame Eugène Verdier' and 'Madame Abel Chateney.' The Committee asked to see these again.

Messrs. James Veitch, Chelsea, sent blue Primroses and hardy flowering shrubs.

W. Marshall, Esq. (Chairman), proposed, and Mr. R. Dean seconded, a vote of condolence with the widow and family of the late Dr. Hogg, and that the same be entered on the minutes.

FLORAL COMMITTEE, APRIL 13, 1897.

W. MARSHALL, Esq., in the Chair, and thirty-one members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To J. P. Morgan, Esq., Dover House, Roehampton (gr. Mr. McLeod), for a large group of Azaleas, Cytisus, Spiræas, Crotons, Boronias, and Ferns.

Silver Flora Medal.

To Captain Holford, Tetbury, Gloucester (gr. Mr. Chapman), for *Hippeastrums*.

To Messrs. Paul & Son, Cheshunt, for Alpine plants and Roses.

To Messrs. Laing, Forest Hill, for foliage and flowering plants.

To Mr. Mount, Canterbury, for Roses.

Silver Banksian Medal.

To Lord Wantage, Lockinge Park, Wantage (gr. Mr. Fyfe), for Roses.

To Mr. H. B. May, Upper Edmonton, for Crotons, *Dracænas*, *Begonias*, and choice Ferns.

To Mr. John Walker, Thame, for Roses.

To The Guildford Hardy Plant Nursery, Millmead, Guildford, for show Auriculas.

To Mr. Rumsey, Waltham Cross, for Roses.

Bronze Flora Medal.

To Messrs. Cutbush, Highgate, for Ericas, Ferns, and hardy flowering shrubs.

Bronze Banksian Medal.

To Sir Trevor Lawrence, Bt., Burford (gr. Mr. Bain), for Anthuriums.

To E. Mawley, Esq., Rosebank, Berkhamsted, for Roses.

First Class Certificate.

To *Erythronium revolutum* (votes, 22 for), from Messrs. Wallace, Colchester. A new and very rare plant. Its beautiful soft pink drooping flowers are borne on long slender peduncles. The foliage is dark green marbled with light green.

Award of Merit.

To *Solanum tuberosum variegatum* (votes, 15 for, 5 against), from Lord Aldenham, Aldenham Park, Elstree (gr. Mr. E. Beckett). The foliage is blotched with soft green and creamy white.

To *Hippeastrum*, 'The Czar' (votes, unanimous), from Captain Holford, Tetbury (gr. Mr. Chapman). Flowers of moderate size and good shape, scarlet running to intense crimson.

To *Hippeastrum* 'Chimborazo' (votes, unanimous), from Captain Holford (gr. Mr. Chapman). A very fine variety, with deep crimson flowers.

To *Hippeastrum* 'Duke of York' (votes, unanimous), from Captain Holford (gr. Mr. Chapman). Flowers, orange scarlet flushed with crimson.

To *Ornithogalum grandiflorum* (votes, 20 for, 1 against), from Messrs. Laing, Forest Hill. Large pure white flowers, borne in clusters of from eighteen to twenty-five, on scapes eighteen inches high.

To *Muscari conicum* (votes, unanimous), from Messrs. Barr, Covent Garden. Deep violet blue flowers on long stout spikes.

To *Tropæolum* 'Phœbe' (votes, unanimous), from Messrs. Cannell, Swanley. A free-growing and free-flowering variety. The flowers are large with deeply cut petals, colour orange yellow blotched with crimson.

To *Fuchsia* 'Addington' (*F. fulgens* × *F. cordifolia splendens*) (votes, 11 for, 5 against), from Messrs. Cannell. Plant of dwarf habit. The drooping tubular crimson flowers are borne in great profusion.

To *Hippeastrum* 'Thunberg' (votes, unanimous), from Messrs. James Veitch, Chelsea. Large, orange red flowers, shaded with crimson.

To *Hippeastrum* 'Ignacite' (votes, unanimous), from Messrs. James Veitch. Ground colour, white suffused with delicate pink and feathered with red. Each segment has a distinct greenish stripe down its centre.

To *Hippeastrum* 'Brenda' (votes, unanimous), from Messrs. James Veitch. Large flowers, of great substance, deep crimson with a greenish yellow centre.

To *Hippeastrum* 'Topaz' (votes, unanimous), from Messrs. James Veitch. Orange-scarlet flowers, margined with white and feathered with white in the throat.

Other Exhibits.

G. Soper, Esq., Harestone, Caterham Valley, sent *Dimorphotheca Ecklonis*.

J. C. Parr, Esq., Grappenhall Heyes, Warrington, exhibited *Rhododendron Nuttalli*.

Mrs. Crawford, Gatton, Reigate (gr. Mr. Slogrove), sent *Pelargonium* 'Beauty of Reigate.'

From H. J. Bartleet, Esq., Severndroog, Shooters Hill, came a very finely grown *Myosotis*.

W. C. Walker, Esq., Winchmore Hill, exhibited *Cannas*.

R. B. Leech, Esq., Dulwich, sent a double yellow Wall-flower.

Mr. Mortimer, Farnham, sent two seedling *Coleuses*.

From J. H. Arkwright, Esq., Hampton Court, Leominster, came very fine specimens of Primrose 'Evelyn Arkwright.'

G. Webb, Esq., Tunstall House, Sittingbourne, exhibited sprays of *Aucuba Japonica*, covered with berries.

E. J. Lowe, Esq., Chepstow, exhibited similar *Aucubas*.

A. Methven, Esq., Bayham Abbey, Lamberhurst, sent a variegated Primrose.

From Messrs. Kelway, Langport, came Double Cinerarias.

Messrs. Sander, St. Albans, again sent *Utricularia Forgetiana*.

FLORAL COMMITTEE, APRIL 27, 1897.

W. MARSHALL, Esq., in the Chair, and twenty-three members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Mr. Mount, Canterbury, for Roses.

Silver Flora Medal.

To Mr. Ware, Tottenham, for herbaceous plants and cut flowers.

To Mr. Frank Cant, Colchester, for Roses.

To Messrs. Barr, Covent Garden, for Tulips.

To Mr. C. Turner, Slough, for Primulas and Alpine Auriculas.

To Messrs. Paul & Son, Cheshunt, for Roses, Amaryllis, and Alpine plants.

Silver Banksian Medal.

To Messrs. Laing, Forest Hill, for foliage and flowering plants.

To Mr. Rumsey, Waltham Cross, for Roses.

To Messrs. Peed, West Norwood, for Ericas, Cannas, Clivias, and Ferns.

Bronze Flora Medal.

To Mr. C. Turner, Slough, for a group of Malmaison Carnation 'Princess May.'

To Messrs. Cutbush, Highgate, for *Azalea mollis*.

Bronze Banksian Medal.

To Mr. H. B. May, Edmonton, for *Coleus*.

First Class Certificate.

To *Rhododendron superbissimum* (votes, unanimous)

Messrs. James Veitch, Chelsea. A dwarf-growing hybrid, with large white fragrant flowers.

To *Lomaria ciliata grandis* (votes, 12 for), from Mr. H. B. May. (For description, see page lxi.)

Award of Merit.

To *Lomaria ciliata major* (votes, 15 for), from Mr. H. B. May, Edmonton. A very graceful Fern with light green spreading fronds and narrow pinnæ.

To *Primula Trailli* (votes, 10 for, 3 against), from G. F. Wilson, Esq., Weybridge. The delicate pink fragrant flowers of this new Himalayan species are borne on long scapes and hang in clusters of from four to seven. (Fig. 27.)

To *Lithospermum tinctorum* (votes, 17 for), from J. T. Bennett-Poë, Esq., Holmewood, Cheshunt (gr. Mr. Downes). A very beautiful plant of dwarf habit, with small, deep blue flowers.

To *Tropæolum* 'Mrs. Sanderson' (votes, unanimous), from Mrs. Sanderson, The Mount, Ealing (gr. Mr. Wood). Deep crimson flowers, borne freely and thrown well above the foliage. The habit of the plant is dwarf and compact.

The *Morus alba pendula* (votes, 12 for), from Messrs. Paul & Son, Cheshunt. A weeping form of the white Mulberry.

To *Auricula* 'Fred. Knighton' (votes, unanimous), from Mr. R. Dean, Ealing. Flowers borne in dense trusses, colour reddish crimson, with a clear yellow eye.

Cultural Commendation.

To Mrs. E. Powys Rogers, Burncoose, Perranwell, Cornwall, for very fine specimens of the New Zealand Forget-me-not, *Myosotidium nobile*.

Other Exhibits.

J. T. Bennett-Poë, Esq., Holmewood, Cheshunt (gr. Mr. Downes), sent plants of *Arctotis Aureola*.

From David Kemp, Esq., Bricket Wood, St. Albans, came a specimen of *Cyrtanthus Mackenni*.

Mr. C. Orchard, Bembridge, I.W., sent a bunch of Wall-flower 'Harper Crewe.'

W. E. Denison, Esq., Ossington Hall, Newark, sent a Golden Calla.

Messrs. Williams, Upper Holloway, sent seedling Hippeastrums.

From Messrs. Laxton, Bedford, came Lilies of the Valley.



FIG. 28.—PRIMULA TRILLI. (*Journal of Horticulture*.)

Messrs. James Veitch, Chelsea, exhibited hardy flowering shrubs and Carnation 'Winter Cheer.'

Messrs. Balchin, Hassocks, sent *Boronias* and *Coprosmas*.

From Messrs. James, Farnham Royal, came a very interesting group of *Cinerarias*, the result of crossing *C. cruenta* with *C. lanata*.

FLORAL COMMITTEE, MAY 11, 1897.

W. MARSHALL, Esq., in the Chair, and twenty-two members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Mr. Mount, Canterbury, for *Roses*.

To Messrs. William Paul, Waltham Cross, for *Roses*.

Silver-gilt Banksian Medal.

To Mr. Box, Croydon, for *Gloxinias*.

Silver Flora Medal.

To Messrs. Barr, Covent Garden, for *Tulips*, &c.

To Messrs. Paul & Son, Cheshunt, for herbaceous plants and hardy shrubs.

To Mr. Walker, Thame, for 'Maréchal Niel' *Roses*.

To Mr. Ware, Tottenham, for herbaceous and Alpine plants.

Silver Banksian Medal.

To Messrs. Kelway, Langport, for tree *Pæonies*.

To Messrs. J. Veitch, Chelsea, for *Tulips* and hardy flowering shrubs.

Bronze Banksian Medal.

To Messrs. Young, Stevenage, for *Gloxinias* and Zonal *Pelargoniums*.

To Messrs. Cutbush, Highgate, for herbaceous plants and hardy shrubs.

To Messrs. Kemp & Wilson, Mortimer Street, for bouquets, &c.

To Messrs. Cheal, Crawley, for hardy flowering trees and shrubs.

First Class Certificate.

To *Anemia rotundifolia* (votes, unanimous), from Mr. Bull,

Chelsea. A new species from Brazil of dwarf spreading and graceful habit, with long fronds and roundish deep green pinnæ. The barren fronds have whip-like extremities from which young plants are produced.

Award of Merit.

To Lilac 'Senator Holland' (votes, 14 for, 2 against), from Sir Trevor Lawrence, Bart., Burford (gr. Mr. Bain). A free flowering variety with semi-double flowers. The colour in the bud state being rosy-purple, and soft lilac when fully expanded.

To Rhododendron 'Pink Pearl' (votes, unanimous), from Messrs. John Waterer, Bagshot. Flowers of great size, borne in huge trusses; colour bright rosy-pink, the upper petal spotted with red.

To Trollius napellifolius (votes, 13 for, 1 against), from Messrs. Barr, Covent Garden. A variety with semi-double deep golden yellow flowers.

To Streptocarpus \times achimeniflora (S. 'Veitch's hybrid' δ S. polyanthus ϕ) (votes, 15 for, 1 against), from Messrs. J. Veitch, Chelsea. Long tubed flowers, borne on stout many branched scapes, colour mauve with a light centre.

Other Exhibits.

The Director, Royal Gardens, Kew, sent a collection of sprays of trees and shrubs, including beautiful specimens of Rhododendron Kewense, R. Sminowi, R. Luscombei, Amelanchier alnifolia, Cytisus purgans, C. Ardoini, and Pyrus Scheideckeri.

Messrs. de Rothschild, Gunnersbury House, Acton (gr. Mr. Hudson), staged Hymenocallis macrostephana.

From the Duke of Marlborough, Blenheim Palace, Woodstock (gr. Mr. Whillans), came magnificent plants of Carnation 'Admiration,' under which name it received an Award of Merit on June 9, 1896. (See Vol. xx., Part 1, page lxxxviii.) By permission of the Council the name was now, at the request of the Duke, changed to 'Duchess Consuelo.'

Sir Weetman Pearson, Bart., M.P., Paddockhurst, Crawley (gr. Mr. Capp), sent a group of Gloxinias, Ferns, and Zonal Pelargoniums.

R. I. Measures, Esq., Ladymead, Rogate (gr. Mr. Wooton), exhibited a specimen of Phyllocactus speciosus grandiflorus.

From the Hon. W. F. D. Smith, M.P., Greenlands, Henley-on-Thames (gr. Mr. Perkins), came *Hippeastrum* 'Hayne.'

E. Jackson, Esq., Theascombe House, Stroud, sent Tree Carnation 'Victoria Regina.'

Mr. Henry Vagg, 65 Central Market, E.C., sent a *Petunia* named Henry Vagg.

From Mr. R. Dean, Ealing, came a double white *Auricula* named 'Diamond.'

Mr. E. H. Krelage, Haarlem, Holland, exhibited a group of herbaceous flowers.

Mr. D. Storrie, St. Madoes Cottage, Glencarse, Perthshire, sent *Auriculas*.

From Messrs. Cripps, Tunbridge Wells, came plants of *Deutzia Lemoinei*.

Mr. Ladhams, Shirley, Southampton, sent hardy flowers.

FLORAL COMMITTEE, MAY 26, 1897.

TEMPLE GARDENS.

W. MARSHALL, Esq., in the chair, and twenty-three members present.

Awards Recommended [see also p. xvii] :—

First Class Certificate.

To *Davallia hirta* (votes, unanimous), from Messrs. Sander, St. Albans. A very graceful fern, with large, broad, deep green arching fronds.

Award of Merit.

To Carnation 'Artemus' (votes, unanimous), from Martin R. Smith, Esq., The Warren, Hayes (gr. Mr. Blick). Moderate sized scarlet flowers, flaked with slate colour.

To *Begonia* 'Queen of Queens' (votes, unanimous), from Mr. Box, Croydon. A variety with large Apricot-coloured flowers.

To *Begonia* 'Diamond Jubilee' (votes, unanimous), from Mr. Box, Croydon. A double yellow variety.

To *Clematis* 'Marcel Moser' (votes, unanimous), from Mr. Moser, Versailles. A variety with large rosy-lilac flowers, with a broad band of deep purplish-lilac down the centre of each petal.

To *Rhododendron* fl. pl. 'Madame Moser' (votes, unanimous),

from Mr. Moser, Versailles. A dwarf growing variety. The semi-double flowers are bright rosy-crimson with crisped petals.

To *Phyllocactus* 'Adonis' (votes, unanimous), from Messrs. James Veitch, Chelsea. Large bright rosy-pink flowers.

To *Phyllocactus* 'Syrens' (votes, unanimous), from Messrs. James Veitch, Chelsea. Salmon-rose flowers, with a deeper centre.

To *Azalea rustica* fl. pl. 'Freya' (votes, 10 for), from Messrs. James Veitch, Chelsea. A pretty variety, with semi-double, salmon-pink flowers. Externally the colour is rich rose.

To *Azalea rustica* fl. pl. 'Ribera' (votes, 11 for, 3 against), from Messrs. James Veitch, Chelsea. The semi-double flowers of this variety are white shaded with blush in the centre. Externally the colour is rosy pink.

To *Caladium* 'Mrs. McLeod' (votes, 9 for), from Messrs. James Veitch, Chelsea. A dwarf growing variety with moderate sized red leaves, beautifully mottled with grey.

To *Caladium* 'Lady Stafford Northcote' (votes, unanimous), from Messrs. James Veitch, Chelsea. A very fine variety with large heart-shaped red leaves, blotched with deep crimson.

To *Pyrethrum* 'Wilson Barrett' (votes, 8 for, 5 against), from Messrs. Kelway, Langport. Double, bright pink flowers, shaded with rose.

To *Clematis* 'Duchess of Albany' (votes, unanimous), from Messrs. Jackman, Woking. The small rose-pink flowers of this variety are borne very freely.

To *Ficus radicans variegata* (votes, 9 for), from Mr. Bull, Chelsea. A pretty variegated form of climbing habit. The small lanceolate leaves are pale green, deeply margined with creamy white.

To *Canna* 'Comte de Bouchard' (votes, unanimous), from Messrs. Paul & Son, Cheshunt, and Messrs. Cannell, Swanley. The deep yellow flowers are heavily spotted and splashed with reddish brown.

To *Croton* 'Her Majesty' (votes, unanimous), from Messrs. Fisher, Son & Sibray, Sheffield. A very graceful variety, with long narrow leaves, colour rich yellow and deep green.

To *Iris* 'Lupina' (votes, unanimous), from Messrs. Wallace, Colchester. The broad standards are brownish red with deeper veins; falls greenish-yellow blotched and striped with maroon.

To Petunia 'Mrs. Fred Sander' (votes, 11 for, 7 against), from Messrs. Sander, St. Albans. A variety with large double rosy-pink flowers with fimbriated edges.

Botanical Certificate.

To Arisæma Bakeriana (votes, unanimous), from Messrs. Sander, St. Albans.

Other Exhibits. [See also p. xvii.]

Mr. Cypher, Cheltenham, sent Bougainvillea Cypherii and Anthurium Scherzerianum 'Cypher's variety.'

Messrs. Cripps, Tunbridge Wells, staged Astilbe Lemoinei 'Gerbe d'Argent.' The Committee asked to see this again.

From Mr. R. Dean, Ealing, came a group of Violas.

Messrs. Gregory & Evans, Sidcup, sent Calceolaria 'Victoria.'

Messrs. Williams, Upper Holloway, sent Hippeastrum 'Victoria.'

From Mr. Fred Perkins, Leamington, came a Tree Carnation named 'Primrose Queen.'

Messrs. Sander, St. Albans, sent Streptocarpus 'Sander's White.' The Committee asked to see this again.

ORCHID COMMITTEE.

JANUARY 12, 1897.

HARRY J. VEITCH, Esq., in the Chair, and seventeen members present.

Awards Recommended:—

Silver Flora Medal.

To Baron Schröder, The Dell, Egham (gr. Mr. H. Ballantine), for a noble example of the finely blotched *Odontoglossum crispum Stevensii*, with fifteen very large and perfect flowers on a spike.

To Messrs. Veitch & Sons, Chelsea, for a group of Orchids.

To F. A. Bevan, Esq., Trent Park, Barnet (gr. Mr. Lees), for

a group of *Odontoglossum Pescatorei*, *O. crispum*, and *Cypripedium insigne*.

Silver Banksian Medal.

To Messrs. Hugh, Low & Co., Clapton, for a group of Orchids.

Award of Merit.

To *Cattleya Loddigesii superba* (votes, unanimous), from Baron Schröder (gr. Mr. H. Ballantine). A very robust, large-flowered form, of bright colour.

To *Cypripedium* × 'Lilian Greenwood' (votes, 7 for, 3 against), from H. Greenwood, Esq., Highfield, Haslingden, Lancashire. A *C. bellatulum* cross, of which the other parent was not stated, but being very close to *C. × Leysenianum* it was probably between *C. bellatulum* and *C. barbatum Warnerii*.

To *Mormodes badium* var. *luteum* (votes, unanimous), from the Hon. Walter Rothschild, Tring Park, Tring (gr. Mr. E. Hill). A remarkable plant, easily distinguished by its broad, flat labellum. The type *M. badium* (Rolfe) has glowing crimson-purple flowers; the variety 'luteum' being entirely bright yellow.

To *Cypripedium* × *Lebaudyanum* (*C. Haynaldianum* × *C. philippinense*) (votes, 8 for, 6 against), from Messrs. Linden, l'Horticulture Internationale, Parc Leopold, Brussels. A distinct hybrid in which the characters of the parents were effectively blended.

To *Lælia* × *Lucy Ingram* (*L. purpurata* ♀ × *L. Perrinii* ♂) (votes, unanimous); from C. L. N. Ingram, Esq., Elstead House, Godalming (gr. Mr. T. W. Bond). A fine flower resembling an enlarged *L. Perrinii*, with labellum approaching in size and colour typical *L. purpurata*.

Botanical Certificate.

To *Bulbophyllum Dayanum*, from the Hon. Walter Rothschild, Tring Park, Tring (gr. Mr. E. Hill).

To *Dendrobium Banerofianum*, from Messrs. F. Sander & Co. The plant resembled a slender *D. speciosum*.

Cultural Commendation.

To Messrs. Linden, Brussels, for *Cochlioda vulcanica maxima*.

Other Exhibits.

Baron Schröder sent a group of fine varieties of *Odontoglossums*, *Cypripediums*, &c.

Messrs. Veitch & Sons, Chelsea, showed *Cattleya* × *Miranda* (*C. Trianae* ♂ × *C. guttata Prinzii* ♀); and *Cypripedium* × *Prospero* (*C. insigne Sanderæ* ♂ × *C. Spicerianum* ♀), the result being a pale *C. × Leeaenum*.

Fred Hardy, Esq., Tyntesfield, Ashton-on-Mersey (gr. Mr. T. Stafford), sent a yellow form of *C. insigne*; *C. × Leeaenum Masereelianum*; *Lælia anceps Dawsonii*, *Dendrobium* × *Cybele*, *D. × Schneiderianum* and *Odontoglossum mirandum*.

C. L. N. Ingram, Esq., Elstead House, Godalming, staged a small group of hybrid *Lælias* and *Lælio-Cattleyas*.

Herr Otto Froebel, Zurich, sent *Odontoglossum Andersonianum* var.

Reginald Young, Esq., Sefton Park, Liverpool, showed *Lycaste Skinnerii*, Young's var. (syn. *L. S. Armeniaca*).

De B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. S. Cooke), showed *Lælia anceps* 'Mrs. De B. Crawshay.' A very fine and richly coloured variety.

Messrs. Linden, Brussels, sent *Cochlioda niniata*, a supposed natural hybrid between *C. Noezliana* and *C. vulcanica*. Also varieties of *Cypripedium insigne*.

John Stark, Esq., Croston Towers, Alderley Edge, Cheshire (gr. Mr. S. Marshall), sent *Cattleya Trianae* 'Bernard.'

Sir Frederick Wigan, Clare Lawn, East Sheen (gr. Mr. W. H. Young), sent a spike of *Cymbidium grandiflorum* (*C. Hookerianum*).

G. W. Law-Schofield, Esq., New Hall Hay, Rawtenstall, Manchester (gr. Mr. Shill), showed a form of *Cypripedium* × *Charles Richman*.

E. S. Clark, Esq., Wrexham, sent *Cypripedium nitens* and *Lælia anceps* var.

Mr. A. J. Keeling, Bradford, sent a light form of *Calanthe* × *Veitchii*.

ORCHID COMMITTEE, FEBRUARY 9, 1897.

SYDNEY COURTAULD, Esq., in the Chair, and eighteen members present.

Awards Recommended :—*Silver Flora Medal.*

To Messrs. Veitch & Sons, Chelsea, for a very fine group of Orchids.

Silver Banksian Medal.

To Messrs. Linden, l'Horticulture Internationale, Parc Leopold, Brussels, for a selection of very fine varieties of *Cattleya Trianae*.

To Messrs. F. Sander & Co., St. Albans, for a group of Orchids.

To Messrs. Hugh Low & Co., Clapton, for a group of Orchids.

Award of Merit.

To *Cattleya Trianae* Imperator (votes, unanimous), from Messrs. Linden. A very fine variety, with labellum almost entirely of a dark purple colour.

To *Cattleya Trianae* eximia (votes, 11 for, 6 against), from Messrs. Linden. A very large and well-formed flower.

To *Laelia anceps* Kienastiana (votes, unanimous), from Frau Ida Brandt, Brunnenhof, Riesbach, Zürich. Flowers large, white, tinted with rose, the front and side lobes of the lip bright rose.

To *Laelio-Cattleya* × *Violetta* (*C. Gaskelliana* ♀ × *L. purpurata* ♂) (votes, unanimous), from Messrs. Veitch & Sons. A showy flower of the same class as *L.-C.* × *Exoniensis*, but formed more like *C. labiata*.

To *Phalænopsis* × *Hebe* (*P. Sanderiana* ♀ × *P. rosea* ♂) (votes, 7 for, 6 against), from Messrs. Veitch & Sons. The flowers resemble a good form of *P.* × *intermedia*.

Cultural Commendation.

To Mr. Jas. Cypher, Queen's Road, Cheltenham, for a grand specimen of *Dendrobium* × *Ainsworthii*, Cypher's variety, and for *Dendrobium* × *splendidissimum grandiflorum*, with growths over 4 feet in length, well furnished with flowers.

Other Exhibits.

Messrs. B. S. Williams & Son, Upper Holloway, sent a fine group of Orchids.

The Right Hon. Joseph Chamberlain, Highbury, Moor



FIG. 29.—DENDROBIUM \times KENNETH. (*Gardeners' Chronicle*.)

Green, Birmingham (gr. Mr. Burberry), showed *Dendrobium* \times *Burberryanum* (*D.* \times *Dominianum* ♂ \times *D. Findlayanum* ♀) and *D.* \times *splendidissimum grandiflorum* ♀ \times *D. aureum* ♂.

The Hon. Walter Rothschild, Tring Park, Tring (gr. Mr. E. Hill), sent *Cypripedium* \times *Enid* (*C. Spicerianum* ♂ \times *C. bellatulum* ♀).

Norman C. Cookson, Esq., Oakwood, Wylam, Northumberland (gr. Mr. Wm. Murray), again showed *Dendrobium* \times *Kenneth* (*D. Bensoniæ* ♂ \times *D. McCarthyæ* ♀). (Fig. 29.)

Thos. Statter, Esq., Stand Hall, Whitefield, Manchester (gr. Mr. R. Johnson), sent *Cypripedium* \times *Rolfei* (*C. bellatulum* \times *C. Rothschildianum*), which seemed to be rather between *C. bellatulum* and some form or hybrid of *C. insigne*, or *C. x Leea-num*. Also *C. x triumphans* (*C. x Sallieri* *Hyea-num* \times *C. x cœnanthum superbum*); *C. x Rubens* (*C. bellatulum* \times *C. callosum*); and *C. villosum giganteum*.

Elijah Ashworth, Esq., Harefield Hall, Wilmslow, Cheshire (gr. Mr. Holbrook), showed *Cattleya Trianae* 'Miss Beatrice Ashworth,' a pretty form of the *C. T. Backhousiana* class.

Messrs. Heath & Son, Cheltenham, showed *Dendrobium nobile* *Heathii*, very bright in colour.

J. Hawthorn Kitson, Esq., Elmet Hall, Leeds (gr. Mr. T. Bonsall), again sent *Odontoglossum Andersonianum* *Kitsoni*.

Reginald Young, Esq., Sefton Park, Liverpool, sent several hybrid *Cypripediums*.

W. M. Appleton, Esq., Weston-super-Mare, showed *Cypripedium* \times *tesselatum*, Appleton's variety (*C. concolor* \times *C. barbatum Warneri*), *C. x Quies* and other varieties.

G. W. Law-Schofield, Esq., New Hall Hey, Rawtenstall, near Manchester (gr. Mr. Shill), sent *Dendrobium* \times *Schneiderianum*.

T. W. Swinburne, Esq., Corndean Hall, Winchcombe (gr. Mr. W. Rendal), sent *Cypripedium Mons. de Curte*, *C. x Swinburnei magnificum*, *C. Boxalli*, and *C. villosum giganteum*.

Welbore S. Ellis, Esq., Hazelbourne, Dorking, showed *Epidendrum Ellisii*, *Lycaste gigantea*, *Odontoglossum Harry-anum*, and *Lælia glauca*.

ORCHID COMMITTEE, MARCH 9, 1897.

SYDNEY COURTAULD, Esq., in the Chair, and seventeen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Veitch & Sons, Chelsea, for a very fine group of Orchids, remarkable in which were *Epidendrum Endresii*, and the hybrids with it ; *E. × Endresio-Wallisii*, and *E. × elegantulum* ; *Cattleya × Miranda* (*C. guttata Prinzii × C. Trianæ*), and *C. × intertexta* (*C. Mossiæ × C. Warnerii*).

To C. L. N. Ingram, Esq., Elstead House, Godalming (gr. Mr. T. W. Bond), for a group of well-grown specimens of *Dendrobium × splendidissimum grandiflorum*.

Silver Banksian Medal.

To Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. H. White), for a fine and interesting group of Orchids, in which were grand examples of some of the smaller *Masdevallias*, &c.

To Messrs. F. Sander & Co., St. Albans, for a very good group of Orchids, containing several excellent forms of *Lycaste Skinnerii*.

To Messrs. Hugh Low & Co., Clapton, for a group of *Dendrobium crassinode* and other Orchids.

First Class Certificate.

To *Bulbophyllum Ericssonii* (*Kränzlin*) (votes, unanimous), from the Honble. Walter Rothschild, Tring Park (gr. Mr. E. Hill). A very fine species, with large heads of yellowish flowers, spotted with purple, and not inaptly likened by the author of the species to *Masdevallia chimæra*.

To *Cymbidium eburneum* (votes, unanimous), from the Right Honble. Earl Brownlow, Ashridge, Gt. Berkhamstead, Herts (gr. Mr. R. B. Lowe).

Award of Merit.

To *Masdevallia × Pourbaixii* (*M. Veitchii × M. caudata Shuttleworthii*) (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. H. White). This, although

of the same parentage as *M. × Kimballiana*, is superior to that variety, the broad orange-red flowers being very fine.

To *Cypripedium × hirsuto-Sallieri* (*C. hirsutissimum × C. × Sallieri Hyeatum*) (votes, unanimous), from Sir Trevor Lawrence, Bart. A very delicately tinted flower, almost an Albino. Flowers pale greenish white, with very faint lilac flush on the petals.

To *Odontoglossum crispum Kegeljanii* (votes, unanimous), from Messrs. Linden, l'Horticulture Internationale, Parc Leopold, Brussels. A well-formed spotted variety. (*Lindenia*, t. 565.)

To *Odontoglossum crispum 'Ami Charles'* (votes, unanimous), from Messrs. Linden. Good shape, petals serrate, and with many purple spots; sepals with fewer and larger spots. (*Lindenia*, t. 566.)

To *Dendrobium × Ainsworthii intertextum* (*D. nobile*, pale var. *× D. aureum*, Lee's var.) (votes, unanimous), from Messrs. J. Veitch & Sons, Chelsea. Flowers large, cream-white, with claret-purple disc to the lip.

To *Lycaste Skinnerii pulcherrima* (votes, unanimous), from Messrs. F. Sander & Co., St. Albans. A fine form with white flowers delicately tinted with pink.

Botanical Certificate.

To *Epidendrum Endresii*, from Sir Trevor Lawrence, Bart., and Messrs. Veitch & Sons.

To *Sarcochilus Hartmannii*, from Sir Trevor Lawrence, Bart.

Cultural Commendation.

To Mr. H. Ballantine, gardener to Baron Schröder, The Dell, Staines, for two forms of the fine *Calanthe × 'Baron Schröder'*, with spikes over 5 ft. in length.

To Mr. W. H. White, gardener to Sir Trevor Lawrence, Bart., Burford, Dorking, for *Brasso-Cattleya × Lindleyana* with twenty-six flowers.

To Messrs. F. Sander & Co., St. Albans, for a magnificent specimen of *Platyclinis glumacea*.

To Mr. Geo. Cragg, gardener to Walter C. Walker, Esq., Percy Lodge, Winchmore Hill, for a fine specimen of *Dendrobium primulinum giganteum*.

Other Exhibits.

The Right Honble. Joseph Chamberlain, Highbury, Moor Green, Birmingham (gr. Mr. H. A. Burberry), sent a small collection of hybrid *Dendrobiums*.

Messrs. Linden, Brussels, sent *Odontoglossum* × *Cirro-Hallii* (*O. cirrhosum* × *O. Hallii xanthoglossum*), which differed from *O. × elegans* (probably *O. cirrhosum* × *O. Hallii leucoglossum*) in the yellower tint of the flowers (*see* *Lindenia*, t. 569); also *O. × Wm. Stevens*, near to *O. × Wilckeanum*.

C. L. N. Ingram, Esq. (gr. Mr. T. W. Bond), showed *Cattleya* × *elata* (*C. Trianae* ♀ × *C. Lawrenceana* ♂).

T. B. Haywood, Esq., Woodhatch, Reigate (gr. Mr. C. J. Salter) showed *Lælio-Cattleya* × *Haywoodii*. Of unrecorded parentage, and allied to *L.-C. × Hippolyta*.

F. A. Bevan, Esq., Trent Park, New Barnet (gr. Mr. Lees), showed a fine *Odontoglossum Hallii*.

Mr. J. R. Hall, Foxwarren Gardens, Cobham, sent spikes of *Phaius* × *hybridus* (*P. grandifolius* ♀ × *P. Wallichii* ♂).

W. A. Gent, Esq., Brooklands, Cheshire, showed various *Dendrobiums*.

H. Howard Vyse, Esq., Stoke Place, Slough (gr. Mr. Page), sent *Lycaste Skinnerii*.

Mr. F. Perry, Spye Park Gardens, Chippenham, sent *Odontoglossum crispum*.

A. Warburton, Esq., Vine House, Haslingden, showed *Odontoglossum crispum Victoria Regina*. Purple tinted and spotted.

Major Joicey, Sunningdale Park (gr. Mr. Fred J. Thorne), sent a good *Dendrobium atro-violaceum*.

S. G. Lutwyche, Esq., showed hybrid *Dendrobiums*.

ORCHID COMMITTEE, MARCH 23, 1897.

SYDNEY COURTAULD, Esq., in the Chair, and eighteen members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Norman C. Cookson, Esq., Oakwood, Wylam, Northum-

berland (gr. Mr. Wm. Murray), for a magnificent plant of *Phaius* × *Cooksonii*, with eighteen spikes of flowers.

Silver Flora Medal.

To Baron Schröder, The Dell, Egham (gr. Mr. H. Ballantine), for a group of rare *Odontoglossums*, &c.

To Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. H. White), for an interesting group of rare Orchids; all remarkably well grown and profusely flowered.

To Messrs. Veitch & Sons, Chelsea, for an extensive group of Orchids.

Silver Banksian Medal.

To Messrs. Linden, l'Horticulture Internationale, Parc Leopold, Brussels, for a group of hybrid *Odontoglossums*.

To De B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. S. Cooke), for a collection of *Odontoglossums*.

To Welbore S. Ellis, Esq., Hazelbourne, Dorking (gr. Mr. Barrell), for *Odontoglossum crispum*, *O. Pescatorei*, &c., remarkably well grown.

To J. Bradshaw, Esq., The Grange, Southgate (gr. Mr. Whiffen), for a group of *Dendrobiums*, &c.

To Thos. Gabriel, Esq., Streatham (gr. Mr. Guyett), for a group in which were some very fine plants of *Dendrobium Wardianum*.

To Messrs. F. Sander & Co., St. Albans, for a group of Orchids.

First Class Certificate.

To *Odontoglossum crispum* Luciani (votes, 13 for, 0 against), from Messrs. Linden, Brussels. A finely-formed flower, heavily blotched with purplish brown.

Award of Merit.

To *Odontoglossum crispum ocellatum* (votes, unanimous), from W. Thompson, Esq., Walton Grange, Stone, Staffordshire (gr. Mr. W. Stevens). A very finely spotted variety, with the flowers suffused with bright rose colour.

To *Dendrobium nobile*, Hutchinson's variety (votes, unanimous), from Major-Gen. Hutchinson, Owthorpe, Bournemouth (gr. Mr. Barnes). Three plants were shown of a similar strain, with large broad-petalled flowers of distinct character. Imported from China.

Cultural Commendation.

To Mr. W. H. White, gr. to Sir Trevor Lawrence, Bart., Burford, Dorking, for a fine plant of *Lælia rubescens*, with eight spikes of flowers.

Botanical Certificate.

To *Angræcum Ellisii* from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White).

To *Epidendrum varicosum* from Welbore S. Ellis, Esq., Dorking (gr. Mr. Barrell).

Other Exhibits.

Frau Ida Brandt, Brunnenhof, Riesbach, Zurich (gr. Mr. Schlecht), sent an interesting collection of cut spikes of *Phalæopsis* and other Orchids.

Sir Trevor Lawrence, Bart., sent a number of varieties of *Epidendrum* obtained between *F. xanthinum* and *E. radicans*.

Messrs. Veitch & Sons showed the extraordinary *Epicattleya* × *matutina* (*Cattleya Bowringiana* ♀ × *Epidendrum radicans* ♂). The growth of the plant much resembled *E. radicans*, even to having aerial roots on the stems, notwithstanding the fact that the seeds were from *C. Bowringiana*, which is totally different in growth. The flowers were about 2 inches across, yellow, tinged with vermilion; the labellums varying much in form from ovate, irregularly notched, to trilobate, as though the character were not fixed.

Walter Cobb, Esq., Dulcote, Tunbridge Wells (gr. Mr. J. Howes), showed *Platyclinis glumacea*, var. *valida*; and a pretty—nearly white—*Cattleya Trianæ*.

W. Wheatley Ball, Esq., Rockhills, Borncliffe, Sheffield, sent *Dendrobium crassinode*.

Malcolm S. Cooke, Esq., Kingston Hill (gr. Mr. Buckell) showed a good *Odontoglossum nebulosum*.

W. Thompson, Esq., sent a home-raised *Odontoglossum* × *excellens*.

Messrs. Hugh Low & Co., Clapton, showed *Cypripedium* × *Prewettii*.

A. H. Smee, Esq., The Grange, Wallington (gr. Mr. Cummins), showed a flower of *Sobralia Ruckerii*.

ORCHID COMMITTEE, APRIL 13, 1897.

HARRY J. VEITCH, Esq., in the Chair, and seventeen members present.

Awards Recommended :—*Silver Flora Medal.*

To Major Joicey, Sunningdale Park, Sunningdale (gr. Mr. Fred J. Thorne), for a group of *Diacrium* (*Epidendrum*) *bicomatum*, splendidly grown, and well furnished with strong spikes of white flowers.

To J. Bradshaw, Esq., The Grange, Southgate (gr. Mr. Whiffen), for a group of *Cymbidiums*, *Dendrobium Jamesianum*, &c.

To Messrs. Veitch & Sons, Chelsea, for a splendid group of rare Orchids.

Silver Banksian Medal.

To F. W. Marter, Esq., Lake House, Byfleet (gr. Mr. Bradley), for a noble specimen of *Ansellia africana*, with nine spikes, bearing in the aggregate 800 flowers.

To Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. H. White), for an excellent group of well-cultivated Orchids.

To the Marquis Camden, Bayham Abbey, Lamberhurst (gr. Mr. A. Methven), for a group of *Dendrobium nobile*, *D. Wardianum*, &c.

To Messrs. Hugh Low & Co., Clapton, for a group of Orchids.

To De B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. S. Cooke), for a collection of *Odontoglossums*.

To C. J. Lucas, Esq., Warnham Court, Horsham (gr. Mr. Duncan), for varieties of *Odontoglossum Andersonianum*, &c.

To Messrs. F. Sander & Co., St. Albans, for a group of Orchids.

First Class Certificate.

To *Odontoglossum* × *Wilckianum*, var. 'Queen-Empress' (votes, unanimous), from Baron Schröder, The Dell, Egham (gr. Mr. H. Ballantine). A very large and showily marked flower of the colours of *O. triumphans*.

To *Lælio-Cattleya* × *Digbyano-Trianæ* (*C. Trianæ* ♀ × *L.*

Digbyana ♂ (votes, unanimous), from Messrs. Veitch & Sons. In general appearance this resembled the previously certificated L.-C. \times Digbyano-Mossiae, but was of a much deeper colour.

To Zygopetalum \times Perrenoudii superbum (Z. intermedium ♀ \times Z. maxillare Gautieri ♂) (votes, unanimous), from Messrs. Veitch & Sons. An improvement on the original, which was exhibited previously by M. Peeters, of Brussels.

Award of Merit.

To Odontoglossum Pescatorei Sligachan variety (votes, unanimous), from J. Wilson Potter, Esq., Sligachan, Croydon. A very large and finely shaped flower; white, with a rose tint on some parts of the segments.

To Odontoglossum \times Andersonianum, Danehurst variety (votes, unanimous), from Sydney Jackson, Esq., Danehurst, Epsom (gr. Mr. E. Short). Flowers large, bright yellow, with red-brown markings.

To Dendrobium albo-sanguineum (votes, 11 for), from R. I. Measures, Esq., Cambridge Lodge, Camberwell (gr. Mr. H. J. Chapman).

Botanical Certificate.

To Cœlogyne elata, from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White).

To Ansellia africana, from F. W. Marter, Esq., Byfleet (gr. Mr. Bradley).

To Maxillaria Houtteana, from Sir Trevor Lawrence, Bart. (gr. W. H. White).

Cultural Commendation.

To Mr. W. H. White, gardener to Sir Trevor Lawrence, Bart., for Cymbidium Devonianum, for Maxillaria grandiflora, and for Miltonia cuneata.

To E. J. Johnson, Esq., Rongham Hall, Bury St. Edmunds, for Cattleya Schröderæ.

Other Exhibits.

W. C. Walker, Esq., Percy Lodge, Winchmore Hill (gr. Mr. Geo. Cragg), sent a stand of Cattleya citrina, and C. Schröderæ.

Messrs. B. S. Williams & Son, Upper Holloway, sent a group of Orchids.

Baron Schröder, The Dell, Egham (gr. Mr. H. Ballantine), showed *Odontoglossum* × *Dellense* (*O. Pescatorei* × *O. prænitens*), which certainly seemed to bear evidence of its parentage, and is totally different from *O. × excellens*.

C. J. Crosfield, Esq., Liverpool (gr. Mr. Barkley), sent good specimens of *Dendrobium Wardianum* and *Odontoglossum crispum*.

Frau Ida Brandt, Riesbach, Zurich (gr. Mr. Schlecht), sent *Epidendrum falcatum*, and other Orchids.

C. L. N. Ingram, Esq., Elstead House, Godalming (gr. Mr. T. W. Bond), showed *Lælio-Cattleya* × 'Sir Wm. Ingram'; and *Cattleya* × Wm. Murray.

Fred Hardy, Esq., Tyntesfield, Ashton-on-Mersey (gr. Mr. T. Stafford), sent *Dendrobium* × 'Clio.'

Captain Holford, Westonbirt, Tetbury (gr. Mr. Chapman), showed a good *Lycaste Skinnerii*.

R. I. Measures, Esq., Camberwell (gr. Mr. H. J. Chapman), sent *Cypripedium* × *Greyanum*, *C. × Lachmee*, and *C. × Quies*.

ORCHID COMMITTEE, APRIL 27, 1897.

HARRY J. VEITCH, Esq., in the Chair, and sixteen members present.

Awards Recommended:—

Silver Flora Medal.

To Welbore S. Ellis, Esq., Hazelbourne, Dorking (gr. Mr. Barrell), for a group of *Odontoglossums*.

Silver Banksian Medal.

To R. Brooman-White, Esq., Arddarroch, Garelochhead, N.B., for a group of *Odontoglossums* and *Cattleya* × *Lawre-Mossiae*.

To Messrs. F. Sander & Co., St. Albans, for a group of Orchids.

To Messrs. Hugh Low & Co., Clapton, for a group of *Cattleyas*, *Odontoglossums*, &c.

To Messrs. B. S. Williams & Son, Upper Holloway, for a group of Orchids.

Bronze Banksian Medal.

To Malcolm S. Cook, Esq., Kingston Hill (gr. Mr. Buckell), for a group of Orchids.

First Class Certificate.

To *Odontoglossum crispum heliotropium* (votes, 8 for), from R. Brooman-White, Esq., Arddarroch, Garelohead, N.B. A fine variety with light rose-pink flowers, blotched with red-brown on the sepals and petals.

Award of Merit.

To *Odontoglossum* \times *excellens* *Lowiæ* (votes, 8 for, 5 against) from Messrs. Hugh Low & Co., Clapton. A good variety with bright yellow flowers blotched with brown.

Cultural Commendation.

To the Marquis Camden, Bayham Abbey, Kent (gr. Mr. Methven), for a fine specimen of *Dendrobium thyrsoiflorum*, with twenty-seven flower spikes.

To Major Joicey, Sunningdale Park, Sunningdale, Berks (gr. Mr. Fred. J. Thorne), for a fine specimen of *Luddemannia Lehmannii*, with a pendulous raceme over 2 feet in length, and bearing seventy-four bright orange-coloured flowers.

To Wm. White Palmer, Esq., Rutland Lodge, Shortlands, Kent, for a finely-flowered specimen of *Dendrobium infundibulum*.

Other Exhibits.

H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Aldous), showed a fine form of *Odontoglossum Hallii leucoglossum*.

F. W. Marter, Esq., Lake House, Byfleet (gr. Mr. P. Bradley), showed *Lælia purpurata* with five and seven flowers respectively on two spikes.

E. J. Sidebotham, Esq., Bowdon, Cheshire, showed *Dendrobium nobile roseum*.

Major Joicey, Sunningdale Park (gr. Mr. Fred. J. Thorne), showed *Eriopsis rutidobulbon*.

ORCHID COMMITTEE, MAY 11, 1897.

HARRY J. VEITCH, Esq., in the Chair, and thirteen members present.

Awards Recommended :—*Silver Gilt Flora Medal.*

To Messrs. Veitch & Sons, Chelsea, for a very fine group of Orchids.

Silver Flora Medal.

To A. H. Smee, Esq., The Grange, Wallington (gr. Mr. Cummins), for a group of fine varieties of *Cattleya Mendelii*, &c.

To Walter C. Walker, Esq., Percy Lodge, Winchmore Hill (gr. Mr. Geo. Cragg), for a good group of Orchids.

To Messrs. Hugh Low & Co., Clapton, for a group of *Cattleyas*, *Odontoglossums*, &c.

Silver Banksian Medal.

To Messrs. B. S. Williams & Son, Upper Holloway, for a group of Orchids.

To Messrs. Cripps & Son, Tunbridge Wells, for fine specimens of *Cypripedium caudatum* and *C. caudatum Wallisii*.

Award of Merit.

To *Cypripedium* × *Chapmanii* *magnificum* (*C. bellatulum* × *C. Curtisii*) (votes, unanimous), from R. I. Measures, Esq., Rogate, Sussex (gr. Mr. Wooton). A fine dark flower of the *C.* × 'Chas. Richman' class.

To *Cypripedium* × *bellatulo-vexillarium* (votes, 9 for, 2 against), from Mrs. Briggs Bury, Bank House, Accrington. A pretty variety near to *C.* × *Leysenianum* and *C.* × 'Lilian Greenwood.'

To *Odontoglossum Andersonianum Bogaerdianum* (votes, unanimous), from De B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. S. Cooke). A very large variety, of good shape, heavily blotched.

To *Lælio-Cattleya* × 'Hippolyta,' *Dulcote* var. (votes, 6 for, 5 against), from Walter Cobb, Esq., Dulcote, Tunbridge Wells (gr. Mr. J. Howes). Flowers larger and of a darker orange-red than the ordinary form.

Botanical Certificate.

To *Cirrhopetalum elegantulum*, from A. H. Smee, Esq., The Grange, Wallington (gr. Mr. Cummins).

To *Oncidium Warneri*, from Frau Ida Brandt, Brunnenhof, Riesbach, Zurich (gr. Mr. Schlecht).

Other Exhibits.

Sir Frederick Wigan, Clare Lawn, East Sheen (gr. Mr. W. H. Young), sent *Lælia purpurata* 'Ethel Grey.' A large white variety with claret-red front to the lip.

The Marquis Camden, Bayham Abbey, Kent (gr. Mr. Methven), showed *Cattleya Mendelii* with seven flowers on a spike.

J. Forster Alcock, Esq., Northchurch, showed *Cyrtopodium virescens* and *Lælia Schilleriana*.

C. L. N. Ingram, Esq., Elstead, Godalming (gr. Mr. T. W. Bond), showed *Cattleya* × 'Rajah' (*C. Trianae* × *C. Warszewiczii*) and *Lælio-Cattleya* × Sir Wm. Ingram.

Malcolm S. Cooke, Esq., Kingston Hill (gr. Mr. Buckell), showed a fine *Masdevallia Harryana*.

Messrs. F. Sander & Co., St. Albans, sent *Cypripedium* × 'Oakes Ames' (*C. Rothschildianum* × *C. ciliolare*), resembling *C. × Massaianum*.

Thos. Statter, Esq., Stand Hall, Whitefield, Manchester (gr. Mr. R. Johnson), showed *Lælia purpurata alba magnifica*.

H. J. Harris, Esq., Chippenham (gr. Mr. W. J. Penton), sent *Odontoglossum Pescatorei*.

E. Bostock, Esq., Tixdale Lodge, Staffordshire, showed ten varieties of *Lælia purpurata* and three of *Cattleya Schröderæ*.

R. Brooman-White, Esq., Arddarroch, Garelochhead, sent *Odontoglossum Andersonianum pulcherrimum* and other *Odontoglossums*.

TEMPLE SHOW.

ORCHID COMMITTEE, MAY 26, 1897.

HARRY J. VEITCH, Esq., in the Chair, and twenty-one members present.

Awards Recommended:—*First Class Certificate.*

To *Odontoglossum crispum* 'Starlight' (votes, unanimous),

from R. Brooman-White, Esq., Arddarroch, Garelohead, N.B.
A remarkably distinct variety with white flowers, tinted with
pink, fimbriated petals, and numerous brown spots on the inner
halves of the segments. (Fig. 30.)

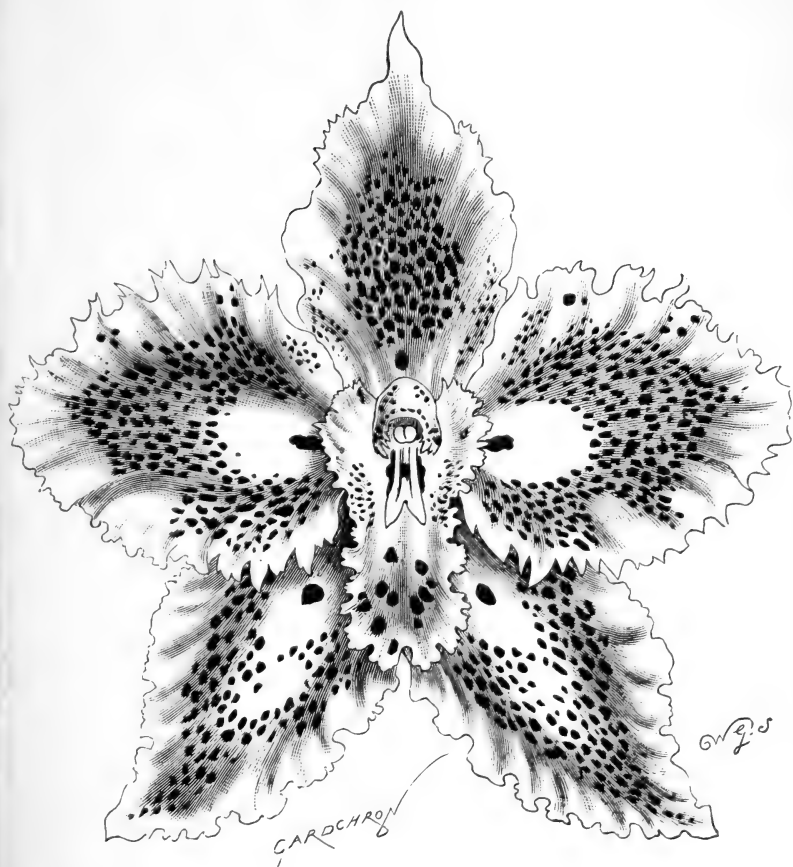


FIG. 30.—*ODONTOGLOSSUM CRISPUM* 'STARLIGHT.' (*Gardeners' Chronicle*.)

To *Cypripedium* × *Chapmanii* *magnificum* (*C. bellatulum* ♀ × *C. Curtisii* ♂) (votes, unanimous), from R. I. Measures, Esq., Rogate, Sussex (gr. Mr. Wooton). This fine hybrid received

an Award of Merit on May 11, and had since then greatly improved. (Fig. 31.)

To *Lælio-Cattleya* × 'Lady Wigan' (*L. purpurata* Russelliana × *C. Mossiæ aurea*) (votes, unanimous), from Messrs. Charlesworth & Co., Heaton, Bradford. A fine flower with blush-white sepals and petals, and finely displayed lip, of a clear pinkish white

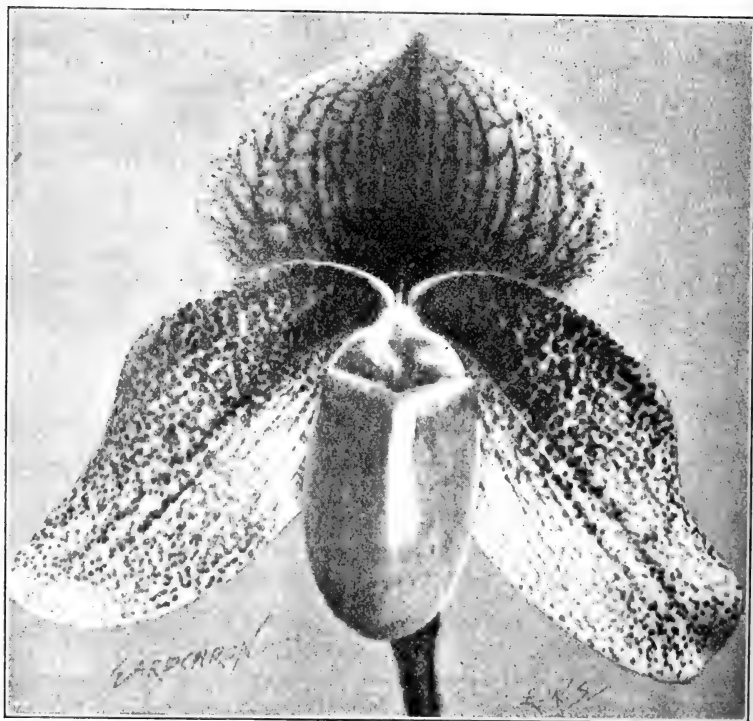


FIG. 31.—*CYPRIPEDIUM* × *CHAPMANII* MAGNIFICUM. (*Gardeners' Chronicle*.)

with some purple lines in the centre, and clear yellow in the tube.

To *Lælia purpurata* Ashworthiana (votes, unanimous), from Elijah Ashworth, Esq., Harefield Hall, Wilmslow, Cheshire (gr. Mr. Holbrook). The peculiarity of this variety is that the petals partake of the colouring of the lip, and are much broader than usual. It is a remote instance of 'trilabellia.'

To *Odontoglossum luteo-purpureum* *sceptrum aureum* (votes, unanimous), from W. Thompson, Esq., Walton Grange, Stone, Staffordshire (gr. Mr. W. Stevens). A singular variety in which the brown colouring of the type is suppressed, the flowers having two shades of yellow.

To *Laelio-Cattleya* \times *Tyntesfieldense* (votes, 13 for), from F. Hardy, Esq. This fine hybrid, evidently a cross of *Cattleya Dowiana*, had a flower equal in size to those of *C. labiata*. Sepals and petals cream-white tinged with rose. Lip resembling *C. Dowiana* in colour, crimped at the edge, dark velvety red, deepening to maroon in the centre, the base bearing a marbling of orange colour.

To *Odontoglossum crispum* 'Queen Victoria' (votes, unanimous), from Messrs. Hugh Low & Co., Clapton. Flowers large and well formed, the segments heavily blotched with brown.

To *Lælia Schilleriana*, Hardy's var. (votes, unanimous), from Fred Hardy, Esq., Tyntesfield, Ashton-on-Mersey (gr. Mr. T. Stafford). A very large and brightly coloured variety.

Award of Merit.

To *Spathoglottis* \times *aureo-Veillardii* (votes, unanimous), from Messrs. Veitch & Son, Chelsea. Flowers about one inch in diameter, yellow with purple markings on the petals and lip.

To *Odontoglossum* \times *excellens* 'Richard Ashworth' (votes, 8 for, 3 against), from R. Ashworth, Esq., Ashlands, Newchurch, Manchester. A large form with cream-white flowers spotted with brown.

To *Anætochilus Sanderianus* (votes, unanimous), from Messrs. F. Sander & Co., St. Albans. Foliage emerald green with golden reticulation and olive-green marbling.

To *Odontoglossum crispum* 'Annie' (votes, unanimous), from W. Thompson, Esq., Walton Grange, Stone, Staffordshire (gr. Mr. W. Stevens). A finely blotched variety.

To *Lælia purpurata fastuosa* (votes, unanimous), from A. Warburton, Esq., Vine House, Haslingden. A very finely coloured variety with unusually broad petals veined with bright purple.

To *Cattleya Mendelii* 'Madonna' (votes, unanimous), from Messrs. W. L. Lewis & Co., Southgate. Flowers blush white with only a slight purple colouring on the lip.

To *Odontoglossum Pescatorei imperiale* (votes, unanimous), from Messrs. Linden, l'Horticulture Internationale, Parc Leopold, Brussels. Flowers large, heavily blotched with purple.

To *Cattleya Mossiæ* 'Empress Queen' (votes, 9 for, 7 against), from Messrs. Linden, l'Horticulture Internationale, Parc Leopold, Brussels. A large and handsome form.

To *Odontoglossum crispum Peetersii* (votes, unanimous), from Mr. A. Peeters, St. Gilles, Brussels. A fine blotched variety.

To *Cœlogyne Dayana*, The Dell var. (votes, unanimous), from Baron Schröder, The Dell, Egham (gr. Mr. Ballantine). Lip larger and darker than in the ordinary form.

To *Cypripedium* × *Conco-bellatulum* (votes, unanimous), from Thos. Statter, Esq., Stand Hall, Whitefield, Manchester. A distinct and finely marked hybrid.

To *Odontoglossum* × *excellens Thompsoni* (votes, unanimous), from W. Thompson, Esq., Walton Grange, Stone, Staffordshire (gr. Mr. W. Stevens). Flowers bright yellow blotched with red-brown.

Botanical Certificate.

To *Dendrobium sanguineum*, from Messrs. Hugh Low & Co. (votes, unanimous). An extraordinary slender species from Borneo. The plant shown bore a single blood-red flower, the equal sepals and petals making it resemble a flower of *Ixia crateroides*, the narrow cramped lip being inconspicuous.

Cultural Commendation.

To Mr. Ballantine (gardener to Baron Schröder), for *Cœlogyne Dayana*, with twenty-four spikes.

NARCISSUS COMMITTEE.

MARCH 23, 1897.

The Rev. C. WOLLEY-DOD in the Chair, and eighteen members present.

Awards Recommended :—*First Class Certificate.*

To Narcissus 'Ellen Willmott' (votes, unanimous), from the Rev. G. H. Engleheart, Appleshaw, Andover. (Fig. 32.)



FIG. 32.—NARCISSUS 'ELLEN WILLMOTT.' (*Gardeners' Chronicle*.)

To *Narcissus* 'Southern Star' (votes, unanimous), from the Rev. G. H. Engleheart. (Fig. 33.)

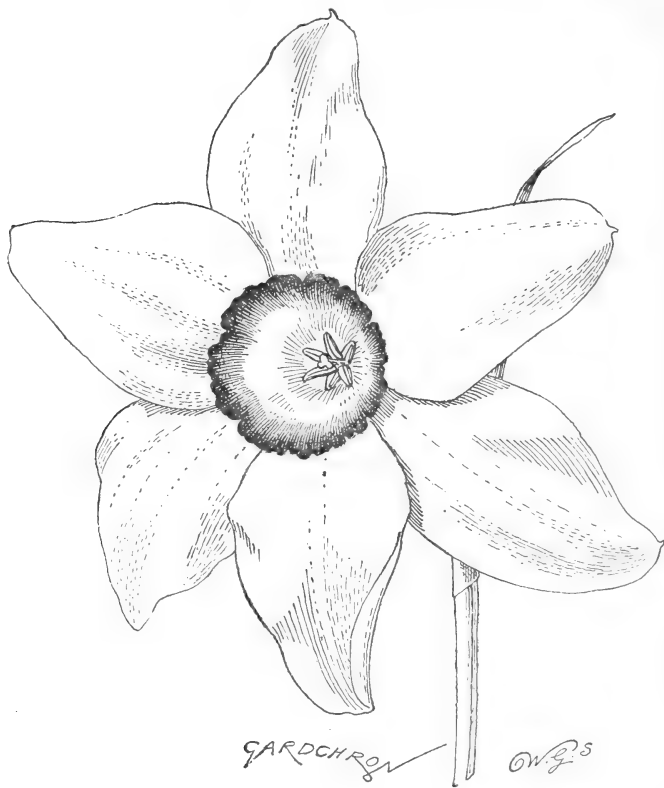


FIG. 33.—*NARCISSUS* 'SOUTHERN STAR.' (*Gardeners' Chronicle*.)

Award of Merit.

To *Narcissus* 'Lettice Harmer' (votes, unanimous).

The Rev. W. Wilks showed a hybrid between *N. cyclamineus* and *N. Ajax*.

NARCISSUS COMMITTEE, APRIL 13, 1897.

The Rev. S. E. BOURNE in the Chair, and five members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To the Rev. G. H. Engleheart, for a group of Narcissi.

To Messrs. Barr & Son, for a group of Narcissi.

Silver Flora Medal.

To Mr. T. S. Ware, Tottenham, for a group of Narcissi.

Silver Banksian Medal.

To J. T. Bennett-Poë, Esq., Holmewood, Cheshunt, for a group of Narcissi.

To Messrs. J. Veitch & Sons, Chelsea, for a group of Narcissi.

First Class Certificate.

To Narcissus 'Snowdrop' (votes, unanimous), from the Rev. G. H. Engleheart.

To Narcissus 'Beacon' (votes, unanimous), from the Rev. G. H. Engleheart.

Award of Merit.

To Narcissus 'Madame de Graaff' (votes, unanimous), from Mr. T. S. Ware, Tottenham.

To Narcissus 'Beauty' (votes, unanimous), from Messrs. Barr & Son, Covent Garden.

Prizes.

Class 3.—Twenty-four varieties of Narcissus, distinct, five blooms of each. Polyanthus excluded. *Amateurs* : First prize, £1. 10s., to Miss Mellish, Worksop.

Class 4.—Seedling Narcissus, not yet in commerce, and not having yet received a prize at any R.H.S. Show. Polyanthus excluded. *Open* : First prize, 10s., to the Rev. G. H. Engleheart, for Narcissus 'Red Prince.'

NARCISSUS COMMITTEE, APRIL 27, 1897.

Awards Recommended:—

Silver Flora Medal.

To the Rev. G. H. Engleheart, Appleshaw, Andover, for a group of Narcissi.

To Messrs. J. Veitch & Sons, Chelsea, for a group of Narcissi.

To Messrs. Barr & Son, Covent Garden, for a group of Narcissi.

Silver Banksian Medal.

To J. W. Wilson, Esq., Drewton Stray, Yorkshire, for a group of Narcissi.

First Class Certificate.

To Narcissus 'Naiad' (N. poeticus ♀ × N. triandrus ♂) (votes, unanimous), from the Rev. G. H. Engleheart.

Award of Merit.

To Narcissus biflorus 'Dr. Laumonier' (votes, unanimous), from the Rev. W. Wilks.

To N. bicolor 'Victoria,' from Messrs. Barr & Son.

To N. b. 'Fred Moore,' from Messrs. Barr & Son.

Prize.

Class 4.—Seedling Narcissus (as on April 13). First prize, 10s., to the Rev. G. H. Engleheart, for Narcissus 'Luna.'

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

JUNE 15, 1897.

Rev. G. HENSLow, M.A., in the Chair.

Fellows elected (62).—Mrs. Anstruther-Thomson, Charles B. Balfour, E. C. Batho, W. J. Batho, Mrs. Theodore Bell, Rev. H. E. Bishop, Miss Borthwick, Hon. J. Boscawen, W. Parkinson Bothamley, M.R.C.S., Dr. Bott, Miss Breton, Miss Burlison, Lindsay Bury, W. H. B. Catford, W. J. Chrystal, Slade H. Clark, H. A. Clifton, F. F. Coleman, Col. Sir H. Collett, Cornelius Cooper, George C. Croft, M. M. Dallemagne, Archibald Day, F. E. Etheridge, John W. Finlinson, David Fleming, Walter Goodliffe, M.A., Sir William Vernon Harcourt, Q.C., M.P., L. V. Harcourt, E. Hawkins, Mrs. M. Hodgkins, Mr. Hoffman, Rev. F. D. Horner, M.A., Samuel F. Hurnard, J.P., Robert M. C. James, Lionel Kentish-Rankin, M.A., F.R.G.S., Miss Laurence, Miss Mabel Lee, W. G. Marshall, Mrs. T. B. Morrish, Arthur P. Nix, Mrs. Parker, W. H. Patterson, J. Prall, Jun., Arthur E. Preston, Pandeli Ralli, Frank Roy (Canada), F. G. Sargood, Charles D. Snell, Mrs. Solly, Lady Alice Stanley, John Morris Stone, M.A., Burnett Tabrum, J.P., Harry T. Tatham, Mrs. E. Meux Tayler, Rev. S. N. Tebbs, B.D., E. P. Youell, James D. Walker, Q.C., Mrs. Walter, Henry Whitehead, John Gillham Womack, Miss Wyburn.

A lecture on "The Physiology of Pitcher-Plants" was given by Prof. S. H. Vines, F.R.S. (See p. 92.)

GENERAL MEETING.

JUNE 29, 1897.

Mr. ALEX. DEAN in the Chair.

Fellows elected (13).—Mrs. Austin, S. Beaumont, S. P. Chatterjee (India), William Greet, Hon. Dr. Radha Halder (India), Sholto Henry Hare, Mrs. W. Haynes, Francis E. Hollond, Mrs. J. H. Hood, H. G. Katte, C. Leeson, W. B. Puckle, Lady Wolverton.

A lecture on the "Storing and Preserving of Fruit" was given by Mr. Jos. Cheal. (See p. 112.)

GENERAL MEETING.

JULY 13, 1897.

Mr. C. E. SHEA in the Chair.

Fellows elected (11).—Dr. J. F. Beattie, Surg. Lieut.-Col. Doig, H. E. Goldfinch, Mrs. Hoskyns, Sidney Charles Lamb (America), Walter Latham, Beaufoi Moore, John Thomas Moore, G. Ogston, F.C.S., Earl of Sandwich, Miss E. W. Wilde.

A lecture on "Mutual Accommodation between Plant Organs" was given by the Rev. George Henslow, M.A. (See p. 153.)

GENERAL MEETING.

JULY 27, 1897.

Dr. E. BONAVIA in the Chair.

Fellows elected (6).—James Bryson, Mrs. G. Carmody, John Evans, Ernest Horsley, Joseph Kent, Com. E. Paget, R.N.

A paper was read on "Familiar Garden Insects" by Mr. W. Drury. (See p. 173.)

GENERAL MEETING.

AUGUST 10, 1897.

Mr. JOHN T. BENNETT-POË in the Chair.

Fellows elected (10).—David Bell, Mrs. W. Black, E. T. Cook, Mrs. Franklin Smith, Sir Edward Grey, Bart., Joseph

Hüneberg (Natal), J. G. Leask, Julius Matton, E. G. E. Scriven, Mrs. J. Seymour Trower.

A lecture on the "Cross-Fertilisation of Florists' Flowers" was given by Mr. James Douglas. (See p. 205.)

GENERAL MEETING.

AUGUST 24, 1897.

Mr. GEORGE BUNYARD in the Chair.

Fellows elected (9).—Charles Butters, John Thomas Butters, Hon. Mrs. Corbet, Mrs. M. L. Denuelle, Chas. G. Emery, Col. Lloyd Howard, Lord Kenyon, F. G. Buller Swete, Charles S. C. Watkins.

A lecture on "Plums" was given by Mr. A. H. Pearson. (See p. 213.)

GENERAL MEETING.

SEPTEMBER 7, 1897.

Mr. J. T. BENNETT-POË in the Chair.

Fellows elected (10).—William Abercrombie, George F. Bennett, Lady Cromer, Edward Edwards, John Wynne Ffoulkes, Mrs. R. D. Garnons Williams, Mrs. M. Polloch Glen, Mrs. Arthur Heywood, W. Horne, Alfred Smith.

A lecture on "Nepenthes (Pitcher Plants)" was given by Mr. H. J. Veitch, F.L.S. (See p. 226.)

GENERAL MEETING.

SEPTEMBER 21, 1897.

Mr. JAMES DOUGLAS in the Chair.

Fellows elected (16).—George Ballard, Rev. E. Bernard, A. K. Bulley, C. S. Burns, Charles Colman, E. W. Craigie, Henry Dickman, M.B., Mrs. T. A. Greene, James Macdonald, Richard Pinches, John Pitts, K. Rouquette, F. G. Treseder, R. W. Treseder, Mrs. Way, Charles Whiting.

Society Affiliated (1).—Swansea and District Horticultural Society.

A lecture on "Cultivation of Cyclamen" was given by Mr. W. Iggulden. (See p. 263.)

DEPUTATION TO SHREWSBURY.

AUGUST 18, 1897.

A Deputation consisting of ten Fellows of the Society was appointed by the Council at the invitation of the Executive of the Shropshire Horticultural Society to visit the Great Commemoration Show at Shrewsbury.

The Deputation consisted of

SIR TREVOR LAWRENCE, Bart., President R.H.S.

PHILIP CROWLEY, Esq., F.L.S., F.Z.S., &c., Treasurer R.H.S.

SYDNEY COURTAULD, Esq., Member of Council.

THOMAS STATTER, Esq., Member of Council.

HARRY J. VEITCH, Esq., F.L.S., Member of Council.

Mr. JAMES DOUGLAS, Member of Council.

H. SELF LEONARD, Esq., of Guildford.

Mr. W. CRUMP, V.M.H., of Madresfield.

Mr. JAMES SMITH, V.M.H., of Mentmore.

Rev. W. WILKS, M.A., Secretary R.H.S.

The Deputation reached Shrewsbury on Tuesday afternoon, August 17, about six o'clock, and were courteously received at the railway station by Mr. Naunton and other members of the Committee, and were shown some of the old buildings for which Shrewsbury is famous, and also the magnificent statue which the Shropshire Horticultural Society had recently erected to the memory of Charles Darwin.

At 8 P.M. the Deputation, who were most comfortably provided for at the Raven Hotel, were entertained at Dinner by his Worship Lieut.-Colonel Peele, Mayor of Shrewsbury.

At 9.45 on Wednesday morning the Deputation assembled on the show ground, which belongs to the Shropshire Horticultural Society, and is one of the prettiest possible spots for a flower show, abounding as it does in magnificent trees, bordered by a fine river and containing a charming piece of ornamental water.

After the Deputation had finished their work of inspection and Awards, they were (together with the judges of the show) entertained at luncheon at 1.30, under the Presidency of the Right Hon. Lord Kenyon, who was supported by the Bishop of Shrewsbury, Sir Lovelace Stamer, Bart., the Very Rev. the Dean

of Rochester, his Worship the Mayor of Shrewsbury, and other local magnates. Lord Kenyon proposed a toast of Prosperity



FIG. 64.—*ODONTOGLOSSUM CRISPUM* 'QUEEN VICTORIA,' see p. xcv. (*Gardeners' Chronicle*.)

to the Royal Horticultural Society, which was responded to by Sir Trevor Lawrence, Bart.

Some of the Deputation stayed in Shrewsbury till Thursday, others left after the luncheon by the 4.40 train to London.

Awards at Shrewsbury.

Gold Medal.

To Messrs. James Veitch & Sons, Chelsea, for the exhibit best representing the progress of Horticulture during the sixty years of Her Majesty's reign.

Silver Gilt Knightian Medal.

To the Hon. Mrs. Ingram, Temple Newsome, Leeds (gr. Mr. R. Dawes), for sixty dishes of Fruit.

To Sir Joseph Pease, Bart., Hutton Hall (gr. Mr. McIndoe) for Fruit.

Silver Gilt Flora Medal.

To Messrs. Cypher, Cheltenham, for twenty specimen plants.

To Mr. C. J. Mee, Nottingham, for a group of plants arranged for effect.

To Messrs. Cypher, Cheltenham, for a group of plants arranged for effect.

To Leopold de Rothschild, Esq., Gunnersbury House (gr. Mr. Hudson) for twenty-two varieties of Water Lilies.

To Messrs. Dicksons, Chester, for a group of hardy plants.

Silver Knightian Medal.

To the Earl of Harrington, Elvaston Castle (gr. Mr. Goodacre) for a decorative dessert table.

Silver Flora Medal.

To Mr. B. R. Davis, Yeovil, for a group of Begonias.

To Messrs. Harkness, Bedale, for a group of hardy bulbous and tuberous plants.

To Mr. Edwin Murrell, Shrewsbury, for a group of Roses and Gladioli.

To Messrs. Perkins, Coventry, for Floral arrangements, Bouquets, Buttonholes, and Sprays.

To Messrs. Ker & Sons, Aigburth, Grassendale, Liverpool, for a group of Crotons.

To Messrs. T. S. Ware, Tottenham, for a group of Begonias.

To Messrs. Smith, Worcester, for a group of Begonias.

Silver Banksian Medal.

To Mr. Myers, Sutton Lane, Shrewsbury, for Zonal Pelargoniums.

To Mr. Campbell, Blantyre, N.B., for a group of Carnations.
To C. E. Newton, Esq., Mickleover Manor, Derby (gr. Mr.
J. Campbell), for very fine bunches of Canon Hall Muscat
Grapes.

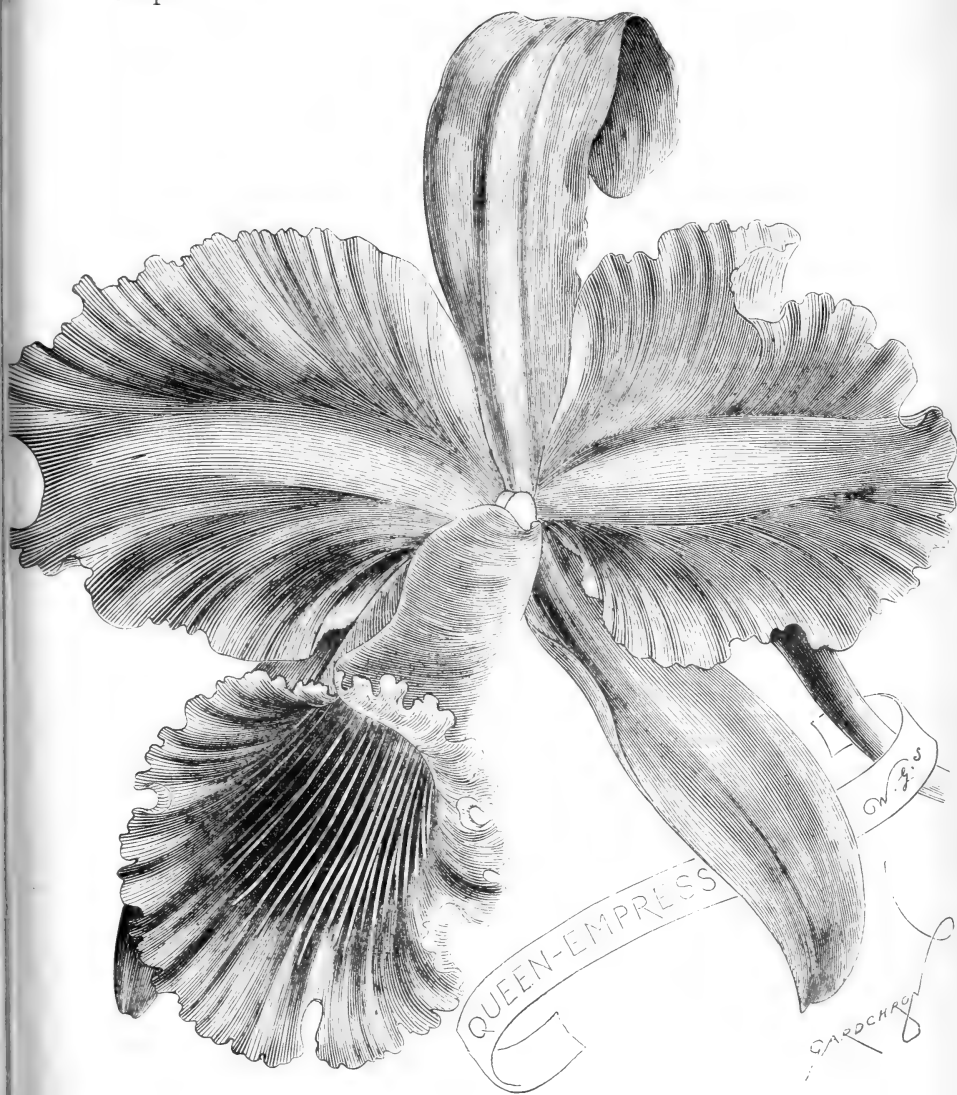


FIG. 65.—CATTLEYA MOSSIE 'EMPRESS QUEEN,' see p. xevi. (*Gardeners' Chronicle*.)

To Messrs. Dobbie, Rothesay, for a group of Dahlias.

To Messrs. Backhouse, York, for a small group of Alpines.

To Messrs. Cowan, Liverpool, for a group of Tea Roses.

To Mr. A. Myers, Sutton Lane, Shrewsbury, for Fuchsias.

To Mr. Thos. Pritchard, Donnington Wood, Shrewsbury, for a Cottager's collection of Vegetables.

To Mr. S. Poole, Springfield, Ludlow, for a Cottager's collection of Potatoes.

To Morgan Williams, Esq., Aberpergwm Glyn, Neath, Glamorgan (gr. Mr. Charles Foster), for a collection of Vegetables.

To the Earl of Carnarvon, Highclere Castle, Newbury (gr. Mr. W. Pope), for a collection of Vegetables.

Bronze Banksian Medal.

To Miss Talbot, Penrice Castle, Swansea (gr. Mr. Richard Milner), for a collection of Vegetables.

To Mr. Thos. Birch, Grimpo, West Felton, for Cottager's Vegetables.

Award of Merit.

To *Dracæna* 'Princess Charles of Denmark' (votes, unanimous), from Messrs. James Veitch & Sons, Chelsea. Leaves dark bronzy olive green, with a well-defined carmine-red margin, the younger leaves with a pale yellow band inside the carmine margin. Dwarf habit.

To *Caladium* 'Silver Queen' (votes, unanimous), from Messrs. Veitch & Sons, Chelsea. Leaves of medium size, silvery-white, mottled with pale green, and with a small carmine spot at the base of the sinus, the veins and margin light green.

To *Begonia* 'Jubilee Queen' (votes, unanimous), from Messrs. T. S. Ware, Tottenham. A fine double white, with fimbriated edges.

To *Begonia* 'Samuel Pope' (votes, unanimous), from Messrs. Ware. A double flesh-coloured flower, with a rose edge, beautifully crimped.

To *Begonia* 'Golden Queen of England' (votes, unanimous), from Messrs. Ware. A very bright, deep-yellow double flower.

Cultural Commendation.

To Mr. S. Bramwell, gardener to H. H. F. Hayhurst, Esq.,

Overley, Wellington, for a magnificent plant of *Rhododendron* 'Princess of Wales' covered with blooms.

To Mr. J. Carter, gardener to W. J. Scott, Esq., Besford House, Shrewsbury, for very finely grown and coloured *Coleus*.

To Mr. A. Myers, Sutton Lane, Shrewsbury, for very finely grown and coloured *Coleus*.

To Messrs. Harkness, Bedale, for beautifully grown *Gladiolus*.

SCIENTIFIC COMMITTEE.

JUNE 15, 1897.

Dr. M. T. MASTERS in the Chair, and four members present.

New Method of Grafting.—Dr. Masters called attention to the fact that the method described at the last meeting had been adopted before by A. Knight; but on turning to that author's paper (*Trans. Hort. Soc.*, Vol. I. p. 239), it is not quite clear whether it is quite the same. According to Knight's figures, the extra "tongue" is not inserted as a duplicate scion, but nailed to the outside of the bark; but in the text it would read as if both tongues grew and covered the stock.

Synanthic Foxgloves.—Specimens were sent from Chiswick, in which the terminal flowers had coalesced, producing a large campanulate structure. This is a familiar monstrosity; but it appears that M. Vilmorin has succeeded in fixing it; over 95 per cent. of seedlings, raised from the normal flowers of the spike, are said to come true, and bear these campanulate blossoms.

Fasciate Buttercup.—A rather curious example was sent by Miss Corpen of Highfield, Hartley, Plymouth, found at Denham Bridge, Devon. Two fasciated stems were so slightly coherent as to readily separate, while the two synanthic blossoms, however, remained firmly coherent.

Definite Lily of the Valley.—Mr. Henslow showed a flower in this unusual condition, in that a scape bore a single terminal flower, in which the whorls were in fours, excepting the pistil.

Romneya with fungus.—Rev. W. Dod sent specimens of *R. Coulteri* badly attacked by some fungus. It was forwarded to Kew for investigation.

Grapes diseased.—Samples of fruit, together with leaves, were received from Mr. James Cameron, of The Gardens, Auchterarder House, attacked by *Glæosporium*. The leaves appear to be scalded, so that the opinion of the Committee was that this mischief should have been carefully avoided. Bordeaux spray at a very early period of the attack might have proved efficacious in checking it.

Campanula Balchiniana ×.—Dr. Masters exhibited drawings of a remarkable phenomenon in this variety. The plant has variegated leaves, and is a hybrid between *C. fragilis* and *C. isophylla*. The sepals are foliaceous, with petioles, while the ovary is entirely superior, and not inferior, as in all the Campanulaceæ. A full description is given at page 271.

Abnormal Fungi in a Mushroom Bed.—With reference to the specimens shown at the last meeting, Mr. A. Sutton undertook to transmit them to two eminent mushroom growers, who have kindly sent the following reports: (1) “Replying to your letter of the 13th with sample of fungus sent, which is unknown. Without seeing the bed or knowing more particulars of the materials used for the same, I could hardly say for certain whether it is caused from the manure not being properly sweetened or from the mould used for casing, most probably from the latter, as I have found this so generally the cause of fungus and mildew, the spores being introduced through the mould; especially, if this is used fresh from a pasture field, it more often than not contains some kind of fungus. The only plan to avoid this is to use mould, if possible, from an arable field, or, without the turf, which has been stacked a year at least, and when using mix a small quantity of salt or slacked lime.” (2) “Replying to your inquiry of the 13th inst., I beg to inform you that the fungus sent is not frequently met with, but I have seen some before. The reason one so seldom meets with it on mushroom-beds is because the loam used in casing the beds is usually procured from open ground, and not from the vicinity of or from under trees. I have no doubt in the least but that the fungus sent you is from the soil used, although soil used from the same heap did not previously develop it, as perhaps the previous lots of soil did not contain any of the spores, or that it possibly generated subsequently. As several beds had been cased from the same heap, I take it for granted that the soil

remained undisturbed for a length of time, and possibly under tree or trees, which would account for its appearance in the last bed. I should say the reason why mushrooms did not appear in due course was, because the manure for the beds was not properly prepared; that it was made up too quickly, and consequently burnt the mycelium in the sets; or that it was not sufficiently fermented, and so rotted the mycelium. If your correspondent makes up another bed, and obtains the soil for casing from elsewhere, he will be convinced that the spawn is not to blame, no matter where he had it from, as I never yet saw any false fungi where the compost has been properly prepared and good loam used. Could you procure a cake of the spawn for my inspection? If so, I will make a careful examination of it, and use it with some that I am shortly spawning a bed with. I would then report further on the subject."

Rhododendron with Fungus.—Mr. W. Wilks brought a specimen of the fungus *Exobasidium rhododendri*. It is described in Dr. W. G. Smith's edition of Tubeuf's *Diseases of Plants*, p. 427.

SCIENTIFIC COMMITTEE, JUNE 29, 1897.

Mr. McLACHLAN in the Chair, and four members present.

Romneya diseased.—The following report was received from Kew upon the specimens sent to the last meeting:—"The disease is caused by an obscure organism, considered by Prunet as a species of *Cladochytrium*. A preliminary notice is given in *Comptes Rendus*, October 1, 1894. The detailed account there promised is not yet to hand."

Grapes attacked by Glæosporium.—With reference to the examples sent to the last meeting, Mr. Malcolm Dunn writes, after inspecting the Vine-houses at Auchterarder House, that "the vinery is of the usual 'lean-to' form, well heated and ventilated, with everything in good order for growing healthy vines and first-rate grapes. The vines comprise some six or seven varieties, but only Black Hamburgh suffers to a serious extent from the disease; although it could be detected on a few berries of Foster's White Seedling, and still fewer of Alicante. As far as I can remember, Muscat of Alexandria, Lady Downes, Madresfield Court, Gros Colmar, and one or two others were

not affected, and, although intermixed with the vines attacked, the vines are all in vigorous health, and bearing a fine crop of splendid bunches of grapes. With regard to the treatment they were receiving, I saw nothing to which I could object."

Harpalus ruficornis attacking Strawberries.—Mr. McLachlan showed specimens of this beetle, which belongs to a carnivorous family. Its prevalence in Strawberry beds is probably caused by the presence of the litter. That it will attack Strawberries has been known for the last ten years, and that it has destroyed entire crops. As it is nocturnal in its habits, it must be looked for at night, for it lives in the soil.

SCIENTIFIC COMMITTEE, JULY 13.

Dr. M. T. MASTERS, in the Chair, and five members present.

Malformed Fungi in Mushroom Bed.—A letter was received from Mr. Taylor, Penbedw, Mold, criticising the reports sent to the last meeting with reference to the loam, as he had splendid results last year with the same loam cut from the open pasture. As the specimens have been lost in the transit to Kew, the committee has been unable to receive the report of an expert upon the fungi themselves.

Cucumber with Adherent Leaf.—A specimen was received from Mr. E. Horsley. The petiole of the leaf had become fused with the base of the fruit, the result being a distortion in the latter—a not uncommon phenomenon.

Cattleya, Synanthic.—This was a fusion between two flowers, the effect being to arrest some parts of the whorls, so that each flower became dimerous. There were two lips.

Poppy with Pistilloid Stamens.—A flower of *Papaver Rhæas* was exhibited with this peculiarity. It is rare in this species, but not infrequent in some others, as the Icelandic.

Chemical Composition of Cattleya.—Two papers prepared by Mr. Smee were laid before the committee by Mr. Veitch, to whom they had been addressed, as Chairman of the Orchid Committee. The first contained some figures connected with the composition of the atmosphere; analyses of old and young pseudo-bulbs were also given, and of the flower, including observations upon the colouring matters of plants. Professor

A. Church, having given consideration to the first of the two papers, reserving the second for a future meeting, remarked that Mr. Smee had scarcely paid sufficient attention to the more recent analyses of the atmosphere and of rain; the amount of CO_2 in the free air over land and sea being now found to be almost absolutely uniform everywhere (except where locally contaminated), and less in quantity than 3 parts in 10,000, so that no conclusions could be drawn from the data furnished in the paper on this point. With regard to the amount of ammonia in the air, it is so infinitesimally small in quantity that it can only be estimated by the most modern and refined chemical operations, so that he was obliged to express some hesitation in accepting Mr. Smee's statements on this point. With regard to Mr. Smee's analysis of pseudo-bulbs and of flowers, Prof. Church observed that they agreed fairly well with the average results hitherto obtained from terrestrial and epiphytic plants, but he thought that the percentage of undetermined ash constituents—viz. about one-half, was far too great, and he questioned the presence of aluminium, observing that though terrestrial species of *Lycopodium* contain much of this metal, epiphytal species of the same genus contain none. He felt sure that some ingredient was wanting which had not been determined. With regard to floral colouring matters, Mr. Smee did not appear to have consulted recent researches. Professor Church had proved that a number of reds, blues, and purples, though called by different names—*c.g.* colein in the *Coleus*, erythrophyll in Copper Beech, fruits, &c., œnolin in black grapes and anthocyanin—were absolutely the same thing, being represented by the formula $\text{C}_{20}\text{H}_{20}\text{O}_{10}$. These became purplish in neutral cells, blue in alkaline, and red in acid cells. Even the blue-green of a certain *Ixia* was due to an alkaline solution of the same substance. With regard to the beetroot, however, and plants allied to it, as the *Amaranthus* and Buckwheat, he found that the red-purple was of a different nature, and he had called it "amaranthin." It gave neither a scarlet nor a blue reaction, neither green nor yellow with acids, but Prof. Church had as yet not determined its actual chemical composition, although he had found it to differ from anthocyanin by its insolubility in absolute alcohol, and by the absence from its spectrum of definite absorption bands. With regard to nutritive solutions,

Professor Church thought that the ordinary solutions for plant-culture containing phosphates and salts of lime should be used for Orchids, not the solution surcharged with nitrogen compounds recommended by Mr. Smee. He would suggest spraying with "pulverised" solutions the epiphytal Orchids, for he had proved with *Echeverias*—as Boussingault had also long ago with other plants—that salts if moist could be absorbed by the surface of the leaf, so that when a lithium salt was placed upon a lower leaf, it was detected in others above. Dr. McNab had previously proved the transmission of lithium salts imbibed by the roots throughout the plant, following the suggestion of Prof. Church to use this salt. Mr. Veitch and Dr. Masters called attention to the practice carried out by amateur Orchid growers of scattering fragments of carbonate of ammonia (smelling salts) so that the vapour might be absorbed. Mr. Henslow suggested that it might be absorbed with the aid of vapour of water, as he had found by experiments that this can be absorbed by leaves.—(*"Transpiration in a Saturated Atmosphere," Journ. Lin. Soc., Bot., xxiii. p. 303.*)

SCIENTIFIC COMMITTEE, JULY 27.

Dr. M. T. MASTERS in the Chair, and six members present.

Hybrid Orchid.—Mr. Veitch exhibited a new hybrid—*Epilælia* ×—between *Epidendrum radicans* and *Lælia purpurata*. The former grows to from 7 to 8 feet in height, but the hybrid is only about 18 inches. Its leaves more resemble those of *Lælia*, nor does it root so freely as the *Epidendrum*. The flowers are larger than those of the latter parent, and scarlet, but with a much broader and blotched lip, approximating to that of the *Lælia*, though the deep mauve colour of this species is entirely wanting. Mr. Veitch observed that it is remarkable that the pollen of *Epidendrum radicans* is potential in crossing *Lælia*, *Cattleya*, and *Sophranitis*, but not with itself. Dr. Masters remarked that this hybrid thus corroborated Reichenbach's statement that the genera *Lælia* and *Epidendrum* were identical.

Apples Diseased.—Dr. Bonavia inquired as to the nature of a disease which so commonly attacks Apples. Dr. Masters

pronounced it to be most probably *Fusicladium dentriticum*, which attacks Apples and Pears, causing them to crack. Mr. Veitch observed that it generally occurs when the tree is in a poor condition, and recommended a renewal of soil in the autumn to strengthen the growth.

Wheat-eared Carnations.—Some examples of this well-known peculiarity were received from Mr. Colville Browne, of Hextable, Kent. Mr. Veitch observed that whenever carnations were grown in large quantities for market, some plants appear among them with this malformation. Dr. Masters added that it was said that the immediate cause was the attack by mites at the apex.

Twin Apple Leaf.—Mr. Browne also sent a specimen in which two leaves were apparently united half-way up, and back to back. An examination of the distribution of the fibro-vascular cords showed that there was only one petiole, a section of which was crescent-shaped, with three or four cords on each half. These coalesced higher up into two distinct bands, from which the cords supplied to each of the twin blades arose. It was analogous to a foliaceous stamen of *Jatropha*, described by Dr. Masters (*Teratology*, p. 255).

Lantana attacked by Insects.—Specimens were received from Chiswick covered with a white mealy-bug known as *Orthezia insignis*, Douglas.

Seeds germinating within a Melon.—A specimen was received in which this peculiarity had occurred. It is not infrequent in Cucumbers, Oranges, and the Papaw. It was observed that the cotyledons were green, though in the absence of light within the fruit. Such occurs also in Pistachio Nuts, Mistletoe, pods of *Cassia fistula*, &c. Professor Church remarked that it probably arose from some modification of the rays of light, which were capable of "greening," although their energy was altered in character. It is observable that plants turn green under all the coloured rays of the spectrum, though Ferns will be green in total darkness if the temperature be adequate.

Pelorian Calceolaria.—Mr. Henslow showed two flowers of the ordinary yellow bedding-out plant, which had assumed the sleeve-like shape instead of the usual slipper.

Cypripedium, Two-lipped.—Dr. Masters showed a specimen

with this malformation, the flower being apparently also changed as to the number of its parts. It appeared to be really synanthic, like the *Cattleya* shown at the last meeting.

Rosa rubrifolia.—He also showed a spray of this red-leaved species, received from Mr. G. Paul, having the gall, 'Robin's pincushion,' likewise intensified in colour.

Hybrid Aristolochia.—Dr. Masters showed a blossom of the first hybrid ever raised in this genus, between *A. brasiliensis* (form) and *A. elegans*, from Bolivia.

Cream-coloured Vallota.—He also exhibited blossoms of this variety. A white one is known to have existed, but is apparently lost to cultivation. It was suggested that crossings should be made with the present one, so that possibly the white variety may reappear.

Chemical Analyses of Orchids.—Professor Church, having carefully considered Mr. Smee's second paper on the chemical processes which are supposed to take place in Orchids, observed that it was somewhat difficult to follow the author's observations as there was a want of systematic cohesion throughout the paper, some parts appearing to be rather irrelevant, and others open to question. Thus, chemists are not agreed upon the composition of chlorophyll; and if they were, there would be in consequence no special light thrown on the cultivation of Orchids. In his observation upon the presence of nitrogen in sewage-grass, Mr. Smee had altogether omitted any mention of nitrates, and no conclusions can be drawn from the absolute quantities given, as they bear no relation to the actual quantities employed, but not stated in the experiments. The diagram supplied by Mr. Smee, Professor Church thought interesting, as approximately representing the gradual loss of earthy salts as one of the causes of decline and death. With reference to his observations on phosphates in connection with the flowering process, it is well known that phosphates generally increase the inflorescence, while nitrogen enhances the foliage, and deepens the green colour of chlorophyll; but Mr. Smee's remarks upon the decomposition of phosphates are extremely doubtful. It has been found in all experiments that ammonias in which phosphorus has replaced nitrogen have always proved fatal to plants. Mr. Smee's experiments on scents, as being formed in the flower itself, are well founded. Lastly, the suggestion that

thorough analyses should be made of all parts of Orchids was advisable, if practicable ; but such would require very accurate work on definite lines. Such only would give valuable results.

SCIENTIFIC COMMITTEE, AUGUST 10.

Dr. M. T. MASTERS in the Chair, and three members present.

Vine Leaves defective.—Some vine leaves, which appear to have decayed prematurely, were exhibited. No fungus was present, and their defective appearance was attributable to too high cultivation, guano being freely used with great heat, and too much water, such being quite consistent with their appearance.

Ribes aureum in Fruit.—Dr. Masters exhibited a branch, bearing a raceme of ripe purple-black berries, of this common shrub. Though introduced by Mr. Douglas from California, the fruit has rarely if ever been seen before. It was received from Mr. Veitch.

Chrysanthemum Leaves attacked by Grubs.—These were received from Mr. Jenkins, and were forwarded to Mr. McLachlan, who reports "that the grubs are very young larvæ of the 'Silver Y-mouth' (*Plusia gamma*). It will attack almost anything. They should be destroyed by hand-picking." The caterpillars are doing considerable damage to the *Chrysanthemums*.

Green-flowered Cross-leaved Heath.—Dr. Masters showed specimens of this unusual condition. It resembles the "Wheat-eared" Carnations sent to the last meeting, and consists of an abnormal repetition of ciliated bracts ; the flower in the centre having been arrested in consequence of an attack by some grub.

Pelargoniums decaying.—Examples of the varieties *Vesuvius* and *West Brighton* were shown, which had decayed from the collar upwards. It was attributed to too deep planting. They had large roots, and had been apparently quite healthy when planted, some being over two-year-old plants. Possibly they were attacked by a slime fungus.

FRUIT AND VEGETABLE COMMITTEE.

JUNE 15, 1897.

T. FRANCIS RIVERS, Esq., in the Chair, and fifteen members present.

Awards Recommended:—

Bronze Knightian Medal.

To Lord Foley (gr. Mr. Miller), Ruxley Lodge, Esher, for a collection of fruit.

Award of Merit.

To Cabbage 'Veitch's Earliest of All' (votes, unanimous), grown at Chiswick from seed sent by Messrs. R. Veitch, of Exeter.

To Cabbage 'Sutton's Earliest' (votes, unanimous), grown at Chiswick from seed sent by Messrs. Sutton, of Reading.

These two cabbages were included in a collection of nineteen varieties which had been grown at Chiswick to test their earliness. These two were fit for use on May 15, and were three weeks earlier than 'Ellam's,' sown on the same date. Both of them are very fine early cabbages, Veitch's being rather dwarfier and a trifle the more forward; Sutton's rather larger and very conical. *See p. 129.*

Other Exhibits.

J. S. White, Esq. (gr. Mr. Martin), East Cowes Park, sent a Melon 'Sixtieth Reign.'

E. Dresden, Esq. (gr. Mr. Tallack), Livermere Park, sent three dishes of very finely kept Apples, 'Wellington,' 'Easter Pippin,' and 'Norfolk Beaufin.'

Earl Percy (gr. Mr. Wythes), Syon House, sent a Melon, 'Thames Bank,' a cross between 'Syon House' and 'Beauty of Syon.' The fruit sent was bluntly oval in shape, red-fleshed, and beautifully netted. It was considered promising, but was not quite ripe.

Lady Fortescue (gr. Mr. Herrin), Dropmore, sent a Melon, a cross between 'Hero of Lockinge' and 'La Favorite,' which was over-ripe.

Dr. Burrell (gr. Mr. Bishop), Westley Hall, sent four Melons,

(1) 'Dr. Lionel Burrell' ('Westley Hall' × 'High Cross Hybrid'), a long oval fruit very green-skinned, well netted, green flesh, very juicy, and of pleasant if not very high flavour; (2) 'Westley Hybrid' ('Nead's Scarlet' × 'High Cross Hybrid'), a round fruit with white skin and green flesh, very juicy; (3) 'Westley Defiance' ('Wm. Tillery' × 'Westley Hall'), a long oval fruit with dark green skin, flesh green and very deep. This was not quite ripe. (4) 'Diamond Queen,' a round fruit with very little netting, white skin, and scarlet flesh.

Mr. W. Palmer, Andover, sent Peas, 'Sutton's A1' and 'Gradus.'

FRUIT AND VEGETABLE COMMITTEE, JUNE 29, 1897.

JOSEPH CHEAL, Esq., in the Chair, and twelve members present.

Awards Recommended:—

Award of Merit.

To Strawberry 'Mentmore' (votes, 6 for, 4 against), from Messrs. Laxton, Bedford. A cross between 'Noble' and 'British Queen.'

Cultural Commendation.

To Mr. George Kelf, gardener to Mrs. Abbott, Regent's Park, for Peaches, 'Royal George,' 'Dymond,' and 'Dr. Hogg.'

To Mr. James Hudson, gardener to Leopold de Rothschild, Esq., Gunnersbury House, for magnificent Plums and Cherries.

Other Exhibits.

Messrs. Kelway, Langport, sent Beans and Peas.

Messrs. Laxton, Bedford, sent a new early Marrow Pea, 'Thomas Laxton' ('Gradus' × 'Earliest of All'), which was desired to be tried at Chiswick. Also Strawberries, (1) 'Alma' ('James Veitch' × 'Sir Charles Napier'), rather small but of magnificent flavour. (2) 'Commodore' ('Royal Sovereign' × 'Latest of All'), which very closely resembled 'Latest of All.' (3) 'Profit' ('James Veitch' × 'Sir Joseph Paxton'), a large roundish fruit, but certainly lacking in flavour. It was requested that they might all be sent to Chiswick for trial.

The Hon. H. E. Butler (gr. Mr. Davies), Nidd Hall, sent two

Melons, (1) a cross between 'Ingestre Hybrid' and 'Triumph,' (2) a cross between 'High Cross Hybrid' and 'Ingestre Hybrid.'

Dr. Burrell (gr. Mr. Bishop) again sent Melons 'Westley Defiance' and 'Dr. Lionel Burrell.'

Lord Aldenham (gr. Mr. Beckett), Aldenham House, sent a very fine early Pea, 'Early Morn,' which was requested to be tried at Chiswick.

Earl Percy (gr. Mr. Wythes) sent Melon 'Thames Bank' and fruiting sprays of the Loquat, *Photinia japonica*.

FRUIT AND VEGETABLE COMMITTEE, JULY 1, 1897.

AT CHISWICK.

GEORGE BUNYARD, Esq., in the Chair, and ten members present.

Awards Recommended :—

Award of Merit.

To Strawberry 'Wonderful' (votes, unanimous), grown from plants sent by Messrs. Geo. Bunyard, of Maidstone. The berries are of a very bright red colour, and somewhat long and tapering in shape. *See* p. 145.

To Broad Bean 'Champion' (votes, unanimous), grown from seed sent by Messrs. Dobbie, of Rothesay. A very heavy cropping longpod. *See* p. 132.

To Broad Bean 'Exhibition Long Pod' (votes, unanimous), grown from seed sent by Messrs. R. Veitch, of Exeter. *See* p. 132.

Highly Commended.

Broad Bean 'Robin Hood' (votes, unanimous), grown from seed sent by Messrs. Harrison, of Leicester. *See* p. 132.

Commended.

Pea 'Saccharine' (votes, unanimous), grown from seed sent by Mr. Sim. *See* p. 138.

Pea 'Harbinger' (votes, unanimous), grown from seed sent by Messrs. Dicksons, of Chester. *See* p. 135.

Pea 'Sans parchemin, hâtif, à large cosse' (votes, unani-

mous), grown from seed sent by Messrs. Vilmorin, of Paris. See p. 138. This Pea is well worth a trial wherever the family is not above prejudice and the cook can be persuaded to consent to cook the peas whole, as they are gathered.

Cultural Commendation.

To Mr. Ward, Mortlake Road, Richmond, for six dishes of Peas and one of Beans grown on an allotment ground.

Other Exhibits :—

A dish of seedling Strawberries was sent by Mr. H. H.

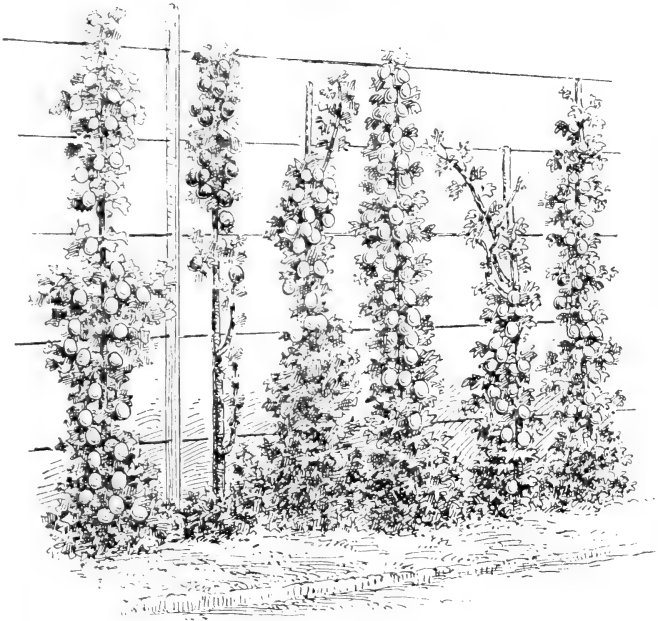


FIG. 66.—CORDON GOOSEBERRIES. (*Journal of Horticulture.*)

Heness, of Berkin Manor, Horton, Slough. They were of good promise, but had been gathered too long.

Mr. Henness also sent a very good seedling Melon; very promising, but perhaps too closely resembling 'Hero of Lockinge.'

Mr. Hopkins, of High Cross, sent a Melon named 'Progress.'



FIG. 67.—BUSH GOOSEBERRIES. (Gardeners' Chronicle.)

Pale yellow skin, much netted, very deep flesh pinkish in colour, nice, juicy, musky. A fruit of some promise.

The Committee inspected 52 varieties of Peas growing in the gardens. *See* p. 133.

Also six varieties of Broad Beans. *See* p. 132.

And 61 varieties of Strawberries. *See* p. 141.

FRUIT AND VEGETABLE COMMITTEE, JULY 13, 1897.

T. FRANCIS RIVERS, Esq., in the Chair, and ten members present.

Awards Recommended :—

Gold Medal.

To Lord Aldenham (gr. Mr. E. Beckett), Aldenham House Elstree, for a magnificent collection of vegetables.

Silver-gilt Knightian Medal.

To Messrs. James Veitch & Sons, Chelsea, for a most interesting exhibit of trained Gooseberry Bushes grown in pots ; some as Cordons, Fig. 66, and others as bushes, Fig. 67.

To Messrs. T. Rivers & Son, Sawbridgeworth, for a number of baskets and dishes of superb fruit of 21 varieties of Cherries.

Silver Banksian Medal.

To Messrs. J. Carter & Co., High Holborn, for a collection of Lettuces and Turnips illustrating the immense variety there is in commerce.

To Messrs. Johnson, of Boston, for dishes of 50 varieties of Peas.

Award of Merit.

To 'The Logan Berry' (votes, unanimous), from Messrs. Bunyard, of Maidstone. It is said to be a cross between the Raspberry and the Blackberry. The fruit is like a very large, long, pointed Raspberry, only that it is (like the Blackberry) destitute of the pithy centre which the ripe Raspberry when gathered leaves behind adherent to the calyx ; the foliage is like the Blackberry. The flavour is like a somewhat brisk Raspberry. It will probably be a very excellent new fruit for cooking purposes. There

appear to be' two varieties of it—one very strong-growing and upright, the other more compact and slightly pendent.

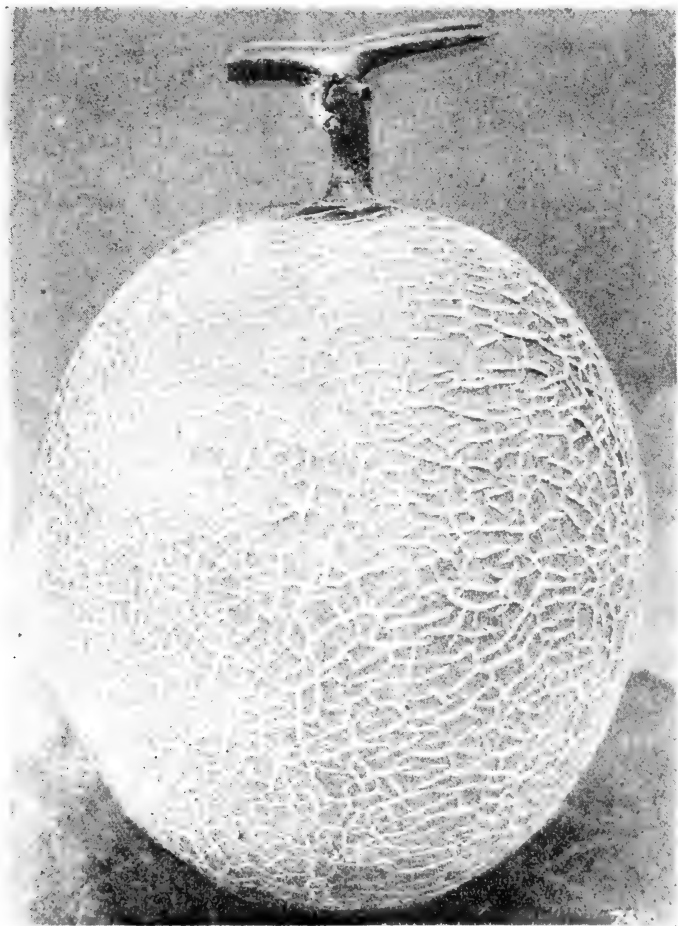


FIG. 68.—MELON 'SYON PERFECTION.' (*Gardeners' Magazine.*)

To Melon 'Syon Perfection' (votes, unanimous), from Earl Percy (gr. Mr. Wythes), Syon House. An oval, deep green-skinned, slightly netted fruit; flesh red and very deep; very sweet and fine flavoured. Fig. 68.

Other Exhibits.

Messrs. J. Veitch & Sons, Chelsea, sent a box of their new Strawberry 'Veitch's Perfection,' which obtained a First-Class

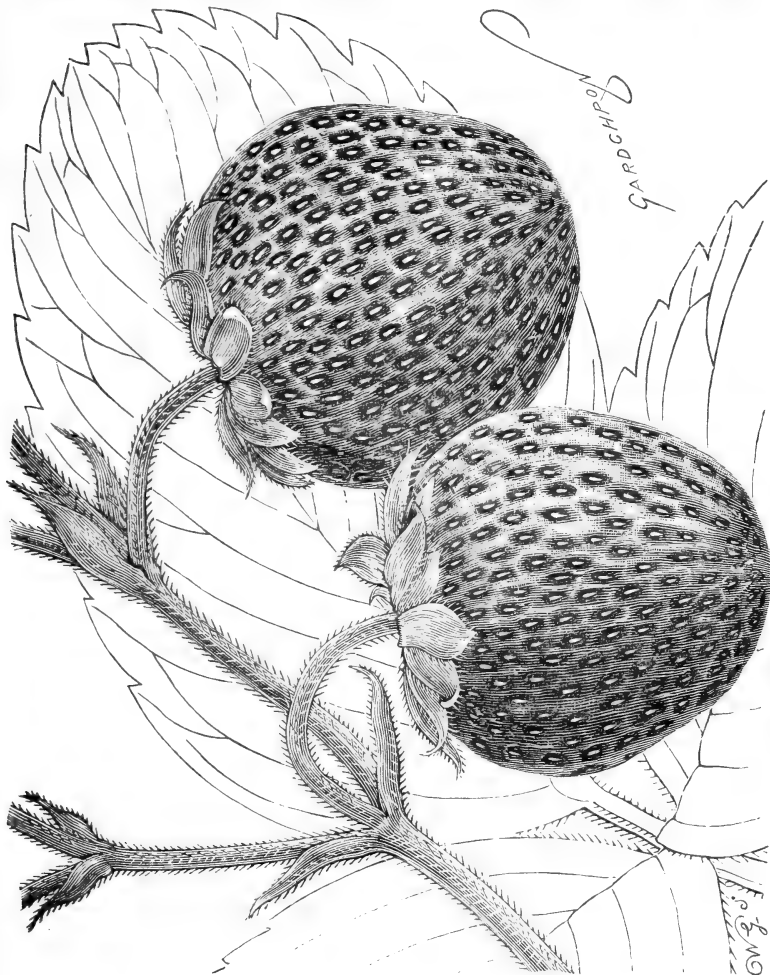


FIG. 69. — STRAWBERRY 'VEITCH'S PERFECTION.' (*Gardeners' Chronicle*.)

Certificate on July 14, 1896. The fruit fully maintained its previous high character and reputation for wonderful sweetness and flavour. Fig. 69.

Messrs. R. Veitch & Son, Exeter, sent 'Exhibition Long Pod' Bean, which the Committee wished to have tried at

Chiswick, as they failed to distinguish it from Messrs. Bunyard's 'Exhibition Long Pod.' They also showed a very good true stock of 'Veitch's Perfection' Pea, and a new Pea 'Goldfinder,' which was not considered superior to 'Ne Plus Ultra.'

Mr. Eckford, Wem, sent five new Peas, 'Ideal,' 'Prior,' 'Diamond Jubilee,' 'Pioneer,' of the 'Ne Plus Ultra' type; and 'Wem Giant Marrow,' very like 'Boston Unrivalled,' but paler green. It was thought that they ought all to be tried at Chiswick.

Lord Suffield (gr. Mr. Allan), Gunton Park, sent a seedling Strawberry 'Lady Suffield,' a cross between 'Empress of India' and 'Lord Suffield.' It was somewhat like 'Gunton Park.'

Earl Percy (gr. Mr. Wythes), Syon House, sent two seedling Melons.

Mrs. M. V. Charrington, Hever, sent some of the old 'Purple Pod' edible Pea.

FRUIT AND VEGETABLE COMMITTEE, JULY 14, 1897.

AT CHISWICK.

T. FRANCIS RIVERS, Esq., in the Chair, and twenty-one members present.

Awards Recommended:—

Award of Merit.

To Pea 'Veitch's Perfection' (votes, unanimous), grown from seed sent by Messrs. R. Veitch & Son, Exeter. *See p. 137.*

To Pea 'Majestic No. 2' (votes, unanimous), grown from seed sent by Messrs. Watkins & Simpson, Strand. *See p. 136.*

To Pea 'Captain Cuttle' (votes, unanimous), grown from seed sent by Messrs. Hurst & Son, Houndsditch. *See p. 133.*

Other Exhibits.

The Committee inspected 52 varieties of Peas. *See page 133.*

Leopold de Rothschild, Esq. (gr. Mr. Hudson), Gunnersbury House, sent a Strawberry named 'Louis Gautier,' said to bear a second crop in the autumn. The fruit was of a very pale colour, almost white, tinged with pink; refreshing and juicy, but of rather poor flavour. The Committee asked to see specimens of the autumnal crop.

FRUIT AND VEGETABLE COMMITTEE, JULY 27, 1897.

PHILIP CROWLEY, Esq., in the Chair, and sixteen members present.

Awards Recommended :—*Silver-gilt Knightian Medal.*

To Messrs. J. Veitch & Sons, Chelsea, for one hundred varieties of Gooseberries.

Award of Merit.

To Nectarine 'Précoce de Croncels' (votes, 7 for, 5 against), from Messrs. J. Veitch & Sons, Chelsea.

Cultural Commendation.

To Mr. D. McAinsh, gardener to Mr. Alderman Samuel, Leeds Castle, for wonderful specimens of Peach 'Sea Eagle.'

Other Exhibits.

Mr. J. Taylor, Hardwicke Grange, Shrewsbury, sent a new Melon, 'Hardwicke Beauty,' a cross between 'Guntun Park' and 'Blenheim Orange,' a very handsome and promising round fruit, much netted, but it had been cut too long.

Mr. Lundy, The Warren, Cobham, sent a dish of the 'Japan Wine Berry.'

Messrs. Stokes, Trowbridge, sent a dish of their new Pea 'Hero of Trowbridge.' Highly Commended at Chiswick, 1896. See Vol. xx. p. 68.

Messrs. Carter, High Holborn, sent eighteen varieties of Turnips, to show the differences of growth, &c.

Earl Percy (gr. Mr. Wythes) showed French Beans 'Veitch's Early Favourite' and 'Wythes' Improved Mohawk.' The first-named was sown on May 3, and ready for use on June 15; the latter, sown on May 21, was ready for use on July 10.

Leopold de Rothschild, Esq. (gr. Mr. Hudson), Gunnersbury House, sent a seedling Melon, a cross between 'Golden Perfection' and 'Blenheim Orange.' The fruit was very oval, and hardly netted at all.

FRUIT AND VEGETABLE COMMITTEE, AUGUST 5, 1897.
AT CHISWICK.

PHILIP CROWLEY, Esq., in the Chair, and sixteen members present.

Award Recommended:—

Award of Merit.

To Potato 'Harbinger' (votes, unanimous), grown from tubers sent by Messrs. Sutton & Son, Reading. See p. 276.

The Committee inspected 42 stocks of Potatos.

They also examined the Vegetable Marrows; and a new Aubergine grown from seed sent by Dr. Bonavia, Worthing, which had the great advantage of a dwarf and compact habit.

FRUIT AND VEGETABLE COMMITTEE, AUGUST 10, 1897.

PHILIP CROWLEY, Esq., in the Chair, and twelve members present.

Awards Recommended:—

Silver Knightian Medal.

To Messrs. Bunyard, Maidstone, for a collection of early outdoor fruits.

Silver Banksian Medal.

To Lord Foley (gr. Mr. Miller), for a collection of fruit.

Award of Merit.

To Gooseberry 'Golden Gem' (votes, unanimous), from Messrs. J. Veitch & Sons, Chelsea; a cross between 'Antagonist' and 'Whitesmith.' The fruits were of a deep buff yellow, and very fine in flavour.

To Blackberry 'Kittatiny' (votes, 8 for), from W. W. Astor, Esq. (gr. Mr. Wadds), Cliveden. Mr. Wadds sent three very long sprays or branches of 'Kittatiny' covered with fruit, and a bunch of fruiting heads of 'Wilson Junior' to compare with the others. 'Kittatiny' was not quite so large a fruit as 'Wilson Junior,' but immensely superior in flavour, and will probably prove to be a real fruit acquisition. Writing of the two Mr. Wadds remarks: "'Kittatiny' is the best. It has not such a large core,

and seems more robust than 'Wilson Junior' and is earlier. These Blackberries are most valuable where there are large demands for fruit for culinary purposes. They come when the bulk of the Raspberries are over, and before the wild English Blackberry is ripe. They are planted in the wettest part of a heavy loam garden, where in winter the ground is even covered with water, to which I attribute the very strong growth they make here."

Cultural Commendation.

To Mr. George Kelf, gardener to Mrs. Abbott, Regent's Park, for a magnificent box of 'Royal George' Peaches grown within two miles of Charing Cross.

Other Exhibits.

F. F. Blaydon, Esq. (gr. Mr. Moody), Sutton-on-Hull, sent Tomato 'Sutton Beauty.' The fruits were very pretty, bright scarlet, exceedingly smooth and globular, with the exception of a very curious and distinct nipple at the flower end. It was also of good flavour and was requested to be tried at Chiswick.

Mr. W. W. Smythe, Basing Park Gardens, sent two new dwarf Beans, 'Scarlet Jubilee,' a hybrid between a French Bean and a Scarlet Runner, and 'Dwarf Goliath,' a hybrid between 'Smythe's Seedling Dwarf' and 'Champion' Scarlet Runner. It was requested that both might be tried at Chiswick. 'Goliath' was remarkably fine and marvellously prolific.

Messrs. Fell, Hexham, sent specimens of the Logan Berry.
See p. cxxiii.

FRUIT AND VEGETABLE COMMITTEE, AUGUST 24, 1897.

PHILIP CROWLEY, Esq., in the Chair, and eleven members present.

Awards Recommended :—

Silver Knightian Medal.

To Captain Macdonald (gr. Mr. G. Elliott), Hurst Side, West Molesey, for a collection of Grapes.

Silver Banksian Medal.

To W. Lawrence, Esq. (gr. Mr. Robinson), Elsfeld House, Hollingbourne, for a collection of vegetables.

To the Dowager Lady Freahe (gr. Mr. A. H. Rickwood), Fulwell Park, Twickenham, for a collection of fruit.

Award of Merit.

To Melon 'Frogmore Scarlet' (votes, unanimous), from Her Majesty the Queen (gr. Mr. O. Thomas), Royal Gardens, Windsor. A cross between 'Duchess' and 'Beechwood.' Fruit oval and well netted, with deep flesh of very rich flavour.

Cultural Commendation.

To Messrs. Rivers & Sons, Sawbridgeworth, for magnificently grown Plums.

Other Exhibits.

Messrs. George Bunyard & Co., Maidstone, sent a collection of Filberts and Cob Nuts.

Mr. W. Kemp, The Gunyah, Barnes, showed some 'Covent Garden Favourite' Cucumbers.

Earl Percy (gr. Mr. G. Wythes), Syon House, sent a large collection of Melons.

The Marquis of Normanby (gr. Mr. J. Corbett), Mulgrave Castle, Whitby, sent Tomatos 'Mulgrave Castle Gem' and 'Royal Sovereign.'

Sir J. Pease, Bart. (gr. Mr. J. McIndoe), Hutton Hall, sent a dish of the Japanese Plum 'Burbank.'

The Baroness Burdett Coutts (gr. Mr. Willard), Holly Lodge, Highgate, sent Melon 'Holly Lodge Hybrid.'

Messrs. Rivers & Sons sent two new varieties of Grapes, viz., 'Gradiska,' a long bunch with roundish oval white berries of medium size; and 'Directeur Tisserand,' having bunches and berries somewhat like those of 'Gros Maroc'; skin thick and covered with a deep blue-black bloom. The Committee wished to see the latter again as late as possible, to test its keeping qualities.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 7, 1897.

PHILIP CROWLEY, Esq., in the Chair, and seventeen members present.

Awards Recommended:—

Silver-gilt Knightian Medal.

To Her Majesty the Queen (gr. Mr. Owen Thomas), Royal

Gardens, Windsor, for magnificent specimens of 22 varieties of Peaches and 15 varieties of Nectarines, all grown in the open air.

Silver Knightian Medal.

To Earl Percy (gr. Mr. Wythes), Syon House, for 70 dishes of fruit.

Silver Banksian Medal.

To Mr. W. Kemp, The Gunyah, Barnes, for 24 fine Melons.

Bronze Knightian Medal.

To Lord Foley (gr. Mr. Miller), Ruxley Lodge, for 15 fine specimens of Peach 'Princess of Wales.'

Award of Merit.

To Blackberry 'Mitchell's Seedling' (votes, unanimous), from Mr. W. Mitchell, Farnham Royal. A seedling from the common Blackberry, on which it was considered an improvement.

To Melon 'Mrs. Herrin' (votes, 6 for, 4 against), from Mr. C. Herrin, Dropmore, a cross between 'La Favorite' and an unnamed seedling. The fruit was sound, densely netted, with very deep white flesh, juicy and refreshing.

Cultural Commendation.

To Mr. W. Taylor, gardener to C. Bayes, Esq., Forest Hill, for 3 magnificent bunches of 'Madresfield Court' Grapes, very finely coloured.

To Mr. W. Howe, gardener to H. Tate, Esq., Streatham, for 12 very fine and grandly coloured 'Stirling Castle' Peaches.

To Mr. W. Farr, gardener to A. Pears, Esq., Isleworth, for Tomatos 'All the Year Round.' The plants stood nearly 6 feet high, and were a mass of fruit from top to bottom.

To Mr. J. Coles, gardener to H. F. Walker, Esq., Highley Manor, Balcombe, for wonderful fruits of Peach 'Exquisite'; an American yellow-fleshed variety, having great size and beauty, but as a rule inferior in flavour to 'Lady Palmerston.'

Other Exhibits.

H. F. Walker, Esq. (gr. Mr. Coles), Highley Manor, sent a seedling Apple, which was considered to be too like 'Domino' to merit a distinctive name.

Lord Foley (gr. Mr. Miller), Ruxley Lodge, sent some very fine specimens of Apple 'Yorkshire Beauty,' syn. 'Greenup's Pippin.'

Mr. C. Martin, Clarence House, East Cowes, sent a Melon raised from seeds ripened on May 7. It was a round, finely netted, scarlet, and very deep fleshed fruit. It had been grown in a cold pit without any warmth. A cross between 'Royal Favourite' and 'Blenheim Orange.' The Committee considered it a promising variety, and suggested it should be grown next year with a little heat, and shown again.

Mrs. Wingfield (gr. Mr. Empson), Amptill, sent a Melon 'Beauty of Amptill' ('Anthony's Favourite' × 'Rangemore'), an oval white-fleshed fruit. Also Scarlet Runner Bean, 'Bunyard's Hill's Prize,' a very fine, probably the best, Bean of its class.

Mr. V. Lift, Sydney Park, Gloucester, sent two seedling Melons.

Mr. W. Miles, Down, sent a black-seeded Scarlet Runner 'The Jubilee.' It was referred to Chiswick for trial.

Messrs. Francis Frew sent new Tomatos.

Mr. John Russell, Richmond, sent Tomato 'Campbell's Prolific,' which was referred to Chiswick for trial.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 8, 1897.

AT CHISWICK.

PHILIP CROWLEY, Esq., in the Chair, and ten members present.

Awards Recommended :—

Highly Commended.

To Potato 'Cardinal,' grown from tubers sent by Mr. Lidstone. *See* p. 274.

To Potato 'Horsford's Seedling,' grown from tubers sent by Mr. F. H. Horsford, Charlotte, Vermont, U.S.A. *See* p. 276.

To Potato 'Ivo,' grown from tubers sent by Major Curtois.

The Committee examined thirty-four varieties of Potatos grown in the Gardens, and selected ten as of good crop and fine appearance, and ordered some of each to be cooked, viz. :—

1. Cardinal.
2. Dr. Kitchen.
3. Hallamshire Hero.

4. Horsford's Seedling.
5. Harrison Scott's Seedling.
6. Ivo.
7. Perfection.
8. Suprême.
9. Syon Maincrop.
10. Windsor Castle, **F.C.C.** 1893.

The Committee considered No. 10 to have well maintained its previous character and reputation. *See* page 274.

Tomatos, Runner Beans, Carrots, and spring-sown Cabbages were also inspected.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 21, 1897.

PHILIP CROWLEY, Esq., in the Chair, and eighteen members present.

Awards Recommended :—

Silver Knightian Medal.

To Mrs. Wingfield (gr. Mr. Empson), Amptill House, for a collection of ten varieties of Onions.

Cultural Commendation.

To Mr. G. W. Woodward, gardener to Roger Leigh, Esq., Barham Court, for twelve magnificent fruits of Pear 'Beurre Mortilet.' This is a most attractive-looking new Pear, but when grown on the quince stock it requires double grafting. Of those shown, six were from a tree grafted on 'Williams' Bon Chrétien' on quince, and six from 'Doyenne du Comice' on quince. As illustrating the influence of stocks, it was mentioned that some fruits from the first tree were so like 'Williams' Bon Chrétien' as to be with difficulty distinguished from it; whilst those from the 'Comice' stock were both larger and shorter fruits.

Other Exhibits.

Mr. Bloxam, of Brickland Manor, Bexley, showed a new Grape, 'Bloxam's Seedling,' a white, very thick-skinned Grape, very similar to 'Trebiano,' with possibly a slightly better flavour. It was considered that if, as was stated, it will keep well till March, when the Committee asked to see it again, it might then prove of value.

Mr. E. Williamson, of Congleton, sent an Apple named 'Sweet William.'

Messrs. J. Veitch & Sons, Chelsea, sent Peach 'Late Devonian.'

Mr. W. Kemp, Barnes, sent twelve Melons, 'The Earl's Favourite,' one of the finest in cultivation.

R. Burrell, Esq. (gr. Mr. A. Bishop), Westley Hall, again sent Melons 'Westley Hall Defiance,' 'Dr. Lionel Burrell,' and 'Westley Hybrid.'

FLORAL COMMITTEE.

JUNE 15, 1897.

W. MARSHALL, Esq., in the Chair, and twenty-one members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. J. Veitch & Sons, Chelsea, for a group of Pæonies, hardy shrubs, and water Lilies.

To Messrs. Kelway & Son, Langport, for Delphiniums, Pæonies, and Pyrethrums.

To Messrs. H. Cannell & Sons, Swanley, for Cannas.

To Mr. M. Prichard, Christchurch, for hardy cut flowers.

To Messrs. J. Peed & Sons, West Norwood, for Carnations.

To Messrs. R. Wallace & Co., Colchester, for Irises, Lilies, and Calochorti.

Silver Banksian Medal.

To Mr. B. Ladhams, Southampton, for Pinks and Campanulas.

To Messrs. G. Cooling & Sons, Bath, for old garden Roses.

To Mr. T. S. Ware, Tottenham, for hardy flowers.

To Messrs. J. Cheal & Sons, Crawley, for hardy flowers and shrubs.

To Mr. Frank Cant, Colchester, for garden Roses.

To Messrs. Paul & Son, Cheshunt, for Alpine plants, Roses, and Pæonies.

To Messrs. Dobbie & Co., Rothesay, for Pyrethrums, Irises, and Pelargoniums.

To Messrs. Barr & Sons, Covent Garden, for hardy flowers.

Bronze Banksian Medal.

To Messrs. A. W. Young & Co., Stevenage, for hardy flowers.

First Class Certificate.

To *Celmisia Munroi* (votes, 16 for), from Messrs. J. Veitch & Sons, Chelsea. A new species from New Zealand. Leaves oblong lanceolate, silvery grey above and silky white below. The large daisy-like flowers are pure white with a yellow disc. Fig. 70.

To *Cedrus atlantica aurea* (votes, 10 for), from Messrs. J. Veitch & Sons. A very handsome variety of graceful habit, with deep yellow foliage.

Award of Merit.

To Carnation 'Cecilia' (votes, unanimous), from Nigel M. Smith, Esq., Hayes. Rich canary-yellow flowers; large, and of good substance.

To Carnation 'Barras' (votes, unanimous), from Martin R. Smith, Esq., Warren House, Hayes (gr. Mr. Blick). A very fine sweet-scented variety with large scarlet blossoms.

To Carnation 'Helmsman' (votes, unanimous), from Martin R. Smith, Esq. A magnificent variety with large pure white blooms.

To *Iris germanica* 'Memory' (votes, 12 for, 4 against), from G. Yeld, Esq., Clifton Cottage, York. Standards pale lavender; falls soft lilac, yellow centre.

To *Rosa macrophylla* (votes, 16 for), from Messrs. Paul & Son, Cheshunt. A vigorous growing Himalayan species with deep green foliage and bright pink flowers.

To *Pæonia albiflora* Whitleyi (votes, 17 for), from Messrs. Paul & Son. A single variety, with large white flowers and conspicuous orange-yellow stamens. There is considerable divergence of opinion amongst growers as to what plant is the true *P. Whitleyi*. The beautiful plant shown by Messrs. Paul has been variously named by botanists *P. albiflora*

laciniata and *P. albidiflora candida*. Some growers give the name of *Whitleyi* to a very fine double incurved white.

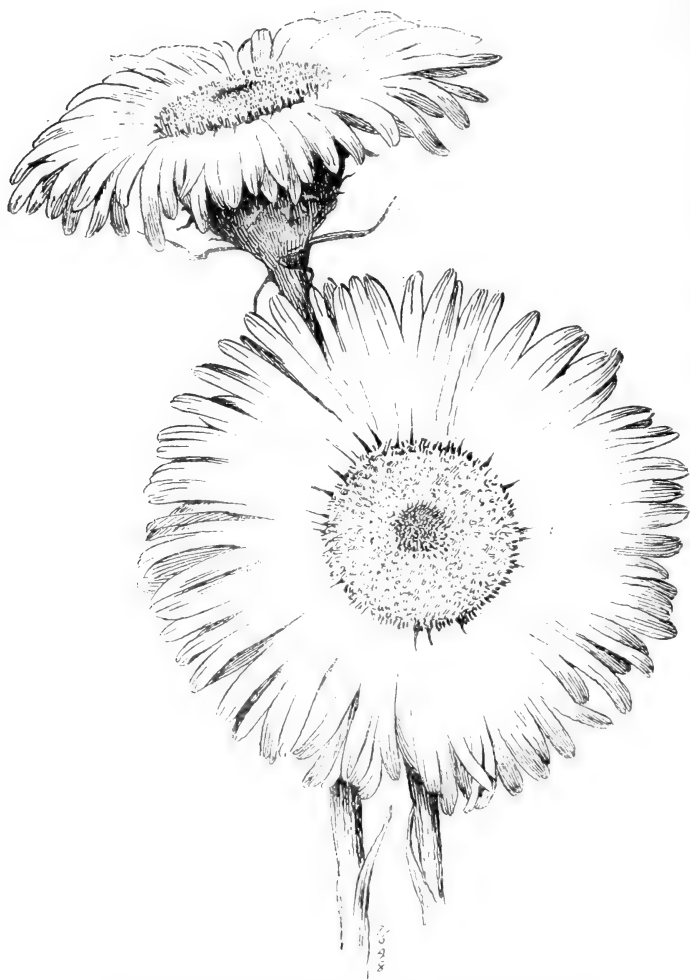


FIG. 70.—CELMISIA MUNROI. (*Gardeners' Magazine*.)

To Delphinium 'Sir John Forrest' (votes, 10 for), from Messrs. Kelway & Son, Langport. A grand spike, with large deep violet-purple flowers with a white eye.

To Delphinium 'Clara Stubbs' (votes, 10 for, 2 against), from Messrs. Kelway & Son. Flowers dark blue, with a white centre.



FIG. 71.—ESCALLONIA LANGLEYENSIS. (*Journal of Horticulture*.)

To Doryopteris nobilis Duvalii (votes, 14 for), from Messrs. J. Veitch & Sons. A dwarf-growing variety with broad deep green palmate fronds.

To Escallonia Langleyensis (*E. sanguinea* ♂ × *E. Philippiana* ♀) (votes, 14 for), from Messrs. J. Veitch & Sons. A distinct and very free-flowering variety of slender growth, with

small lanceolate deep green leaves and small bell-shaped rose-pink flowers. Fig. 71.

To Pink 'Albino' (votes, unanimous), from Mr. J. Lamb, Burton Joyce, Notts.; and Mr. F. Gifford, Tottenham. A fine variety with large, pure white, sweet-scented flowers.

To *Iris germanica maxima* (votes, 11 for, 1 against), from Mr. T. S. Ware, Tottenham. Standards erect, broad, pale blue; falls rich purplish blue.

To *Calochortus Gunisonii* (votes, unanimous), from Messrs. R. Wallace & Co., Colchester. A very beautiful species with large white flowers, with a greenish-yellow centre covered with yellow hairs.

Other Exhibits.

F. W. Moore, Esq., Botanic Garden, Glasnevin, sent cut flowers of *Fremontia californica*, *Kniphofias*, *Abutilons*, &c.

From Martin R. Smith, Esq., Warren House, Hayes (gr. Mr. Blick), came a collection of Carnations.

H. J. Elwes, Esq., Colesbourne Park, Andoversford, exhibited an unnamed species of *Arum*.

E. H. Watts, Esq., Devonhurst, Chiswick (gr. Mr. Gibson), sent a new *Coleus* named 'Minnie Watts.'

J. Higson, Esq., Oakmere Hall, Northwich (gr. Mr. Brunton), sent a seedling *Geranium*.

Pandeli Ralli, Esq., Alderbrook, Cranbrook (gr. Mr. Barks), exhibited *Carnation* 'Pandeli Ralli.'

G. Yeld, Esq., Clifton Cottage, York, brought a group of *Irises* and *Day Lilies*.

A. G. Renshaw, Esq., Lepe, Exbury, Southampton, sent a collection of *Columbines*.

Mr. J. T. Gilbert, Dyke, Bourne, Lincs., sent two varieties of *Anemones*.

Mr. G. Dunn, Adrian Road, Abbots Langley, sent a variegated form of the well-known zonal *Pelargonium* 'Henry Jacoby.'

J. W. Thompson, Esq., Holywath Cottage, Coniston, Lancashire, sent a specimen of *Nephrolepis nana*.

Mr. W. Palmer, Junction Road, Andover, sent a Pink named 'Diamond Jubilee.'

Mr. C. G. Van Tubergen, jun., Haarlem, sent some very fine blooms of *Iris Gatesi*.



FIG. 72.—DIERVILLA SESSILIFLORA. (*Gardeners' Chronicle*.)

From Mr. C. Turner, Slough, came a group of Carnations.

Mr. C. Dymott, Millbrook Road, Freemantle, sent a group of Pelargonium 'Harry Dymott.'

Mr. Gifford, Tottenham, exhibited a group of Delphiniums.

FLORAL COMMITTEE, JUNE 29, 1897.

W. MARSHALL, Esq., in the Chair, and eighteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. J. Veitch & Sons, Chelsea, for a magnificent collection of Conifers and hardy shrubs, amongst the latter being the beautiful yellow flowering *Diervilla sessiliflora*. Fig. 72.

Silver Gilt Flora Medal.

To J. P. Morgan, Esq., Dover House, Roehampton (gr. Mr. McLeod), for a large group of Malmaison Carnations.

Silver Gilt Banksian Medal.

To Mr. H. B. May, Upper Edmonton, for 108 varieties of Adiantums.

To Messrs. F. Sander & Co., St. Albans, for a group of Anthuriums, Begonias, Watsonias, and Orchids.

Silver Flora Medal.

To Messrs. W. Cutbush & Son, Highgate, for Carnations.

To Messrs. Dobbie & Co., Rothesay, for Sweet Peas, Violas, and Pansies.

To Messrs. R. Wallace & Co., Colchester, for a collection of Calochorti and Lilies.

To Mr. T. S. Ware, Tottenham, for hardy flowers.

Silver Banksian Medal.

To Messrs. W. Paul & Sons, Waltham Cross, for Roses.

To Mr. M. Prichard, Christchurch, for hardy flowers.

To Messrs. H. Cannell & Sons, Swanley, for Begonias.

To Mr. F. G. Foster, Havant, for Sweet Peas.

To Messrs. Kelway & Son, Langport, for Delphiniums, Irises, Gaillardias, and Cannas.

To Mr. W. Rumsey, Waltham Cross, for Roses.

To Messrs. J. Cheal & Sons, Crawley, for a collection of hardy flowering trees and shrubs.

To Messrs. Barr & Sons, Covent Garden, for hardy flowers.

First Class Certificate.

To *Thuja gigantea aurea* (votes, 12 for), from Messrs. J. Veitch & Sons, Chelsea. A highly ornamental variety with rich golden-yellow foliage.

To *Adiantum fasciculatum* (votes, 8 for), from Mr. H. B. May, Edmonton. A vigorous growing variety of graceful habit, with broad fronds and light green pinnæ.

Award of Merit.

To Carnation 'Hampden' (votes, 6 for, 2 against), from Martin R. Smith, Esq., The Warren, Hayes (gr. Mr. Blick). A variety with large salmon-rose coloured flowers.

To H. T. Rose 'Kaiserin Augusta Victoria' (votes, unanimous), from Messrs. Paul & Son, Cheshunt. Flowers white with a sulphur-yellow centre.

To H. T. Rose 'Souvenir de Président Carnot' (votes, unanimous), from Messrs. Paul & Son. A fine variety with large pale blush flowers.

To H. T. Rose 'Madame A. Chatenay' (votes, unanimous), from Messrs. Paul & Son. A free-growing variety, with fragrant flowers; colour pale salmon, deeper towards the centre.

To *Calochortus clavatus* (votes, 9 for), from Mr. C. G. Van Tubergen, Jun., Haarlem, and Messrs. R. Wallace & Co., Colchester. A very rare species of great beauty. Flowers large, golden-yellow with purple anthers, and brown markings at the base of the petals.

To H. T. Rose 'Marquise Litta' (votes, unanimous), from Messrs. W. Paul & Son, Waltham Cross. A very distinct variety, with rich rosy-carmine flowers.

To *Begonia* 'Lady Pearson' (votes, 7 for), from Messrs. J. Laing & Sons, Forest Hill. A handsome variety, with large double salmon-scarlet flowers of good form.

Botanical Certificate.

To *Encephalartos gracilis* (votes, unanimous), from Messrs. F. Sander & Co., St. Albans.

Other Exhibits.

Sir Trevor Lawrence, Bart., Burford (gr. Mr. Bain), sent examples of *Hedysarum multijugum* and *Myosotis palustris grandiflora*.

From Lord Penzance, Eashing Park, Godalming, came a group of Roses.

Purnell Purnell, Esq., Woodlands, Streatham Hill, staged a small group of Carnations.

R. Foster, Esq., Homewood, Chislehurst (gr. Mr. Last), sent a seedling Carnation.

A. Chandler, Esq., Haslemere, sent specimens of *Delphinium* 'Ethel Hutchinson.'

H. Barnard, Esq., Chase Side, Southgate, sent a *Lobelia* named 'Barnard's Gem.'

Mr. J. Douglas, Edenside, Great Bookham, exhibited Carnation 'Mrs. Patrick Campbell.'

Messrs. W. Atlee Burpee & Co., Philadelphia, U.S.A., sent seven new varieties of Sweet Peas. The Committee requested that seed might be sent to Chiswick for trial.

Mr. J. Lamb, Burton Joyce, Notts., sent exceptionally fine flowers of Pink 'Albino.'

Mr. C. Leeson, Wrawby, Brigg, sent a large-flowered *Begonia* named 'Charles Leeson.'

Mr. W. Wells, Redhill, Surrey, sent a small group of early flowering *Chrysanthemums*.

ROSE SHOW.

MIXED VARIETIES.

Class 1. Twenty-four single trusses, distinct. Amateurs. First, Silver Cup or £4, to T. B. Haywood, Esq., Woodhatch, Reigate (gr. Mr. Salter); second, £2, to C. J. Grahame, Esq., Leatherhead; third, £1, to Rev. J. H. Pemberton, Havering, Essex.

Class 2. Twelve single trusses, distinct. Amateurs. First, £2, to O. G. Orpen, Esq., West Bergholt, Colchester; second,

£1. 10s., to Rev. A. Foster-Melliar, Sproughton Rectory, Ipswich; third, £1, to R. H. Langton, Esq., Raymead, Hendon.

Class 3. Six single trusses, distinct. Amateurs. First, £1, to G. W. Cook, Esq., Torrington Park, near Finchley; second, 15s., to Rev. F. Page Roberts, Scole, Norfolk; third, 10s., to J. Christian, Esq., 3 Norman Villas, Highgate.

Class 4. Nine single trusses of any one variety of H.P. or H.T. Amateurs. First, £1. 10s., to C. J. Grahame, Esq.; second, £1, to T. B. Haywood, Esq. (gr. Mr. Salter); third, 15s., to Rev. F. Page Roberts.

Class 5. Six single trusses of any one variety of H.P. or H.T. Amateurs. First, £1, to O. G. Orpen, Esq.; second, 15s., to R. H. Langton, Esq.; third, 10s., to G. W. Cook, Esq.

TEAS AND NOISETTES.

Class 6. Twenty-four single trusses, not less than twelve varieties or more than three trusses of any one variety. Amateurs. First, Silver Cup or £4, to O. G. Orpen, Esq.; second, £2, to C. J. Grahame, Esq.; third, £1, to T. B. Haywood, Esq. (gr. Mr. Salter).

Class 7. Twelve single trusses, not less than nine varieties, or more than two trusses of any one variety. Amateurs. First, £2, to Rev. Hugh A. Berners, Harkstead Rectory, Ipswich; second, £1. 10s., to Rev. A. Foster Melliar; third, £1, to Rev. J. H. Pemberton.

Class 8. Six single trusses, not less than four varieties. Amateurs. First, £1, to Rev. F. Page Roberts; second, 15s., to R. H. Langton, Esq.

Class 9. Nine single trusses of any one variety. Amateurs. First, £1. 10s., to C. J. Grahame, Esq.; second, £1, to O. G. Orpen, Esq.

Class 10. Six single trusses of any one variety. Amateurs. First, £1, to R. H. Langton, Esq.; second, 15s., to Rev. A. Foster Melliar; third, 10s., to Rev. Hugh A. Berners.

FLORAL COMMITTEE, JULY 5, 1897. AT CHISWICK.

W. MARSHALL, Esq., in the Chair, and nine members present.

Awards Recommended:—

Award of Merit.

To Viola 'Blue Gown' (votes, unanimous), from Dr. Stuart,

Hillside, Churnside, N.B. Plant of dwarf habit, very free flowering; flowers large, blue, yellow eye. It stands drought well.

To Viola 'William Neil' (votes, unanimous), from Messrs. Dobbie & Co., Rothesay. Plant of bushy habit, very free flowering; flowers large, pale rosy lilac, lower petals pale lilac, yellow eye.

To Viola 'Mrs. H. Bellamy' (votes, unanimous), from Messrs. Dobbie & Co. A free-growing variety with flowers of moderate size; pale lavender margined with blue, lower petals bluish purple, clear yellow eye.

Highly Commended.

To Viola 'Iona' (votes, unanimous), from Messrs. Dobbie & Co. Plant of dwarf spreading habit; flowers of medium size, deep velvety blue, upper petal light blue, yellow eye.

To Viola 'Pencaitland' (votes, unanimous), from Messrs. Dobbie & Co. A fine variety of bushy habit; flowers large, white, yellow eye, slightly rayed.

To Tea and Hybrid Tea Roses: 'Augustine Halem,' 'Innocente Pirola,' 'White Lady,' 'Madame Pernet Ducher,' 'Souvenir de Paul Néron,' 'Marie Van Houtte,' 'Grand Duc de Luxemburg,' 'Etoile de Lyon,' 'Francesca Kruger,' 'Hon. Edith Gifford,' 'W. A. Richardson,' and 'Edmund Sablayrolles.'

(See Report on Roses, page 283.)

FLORAL COMMITTEE, JULY 13, 1897.

W. MARSHALL, Esq., in the Chair, and twelve members present.

Awards Recommended :—

Silver Gilt Flora Medal.

To Mr. H. B. May, Edmonton, for a large collection of Aspleniums.

Silver Gilt Banksian Medal.

To Messrs. J. Veitch & Sons, Chelsea, for a magnificent group of hardy flowers.

Silver Flora Medal.

To Messrs. R. Wallace & Co., Colchester, for Lilies and Calochorti.

To Mr. Frank Cant, Colchester, for Roses.

To Mr. Eckford, Wem, for Sweet Peas.

To Mr. Ladhams, Southampton, for hardy flowers.

Silver Banksian Medal.

To Mr. T. S. Ware, Tottenham, for hardy flowers.

To Mr. B. R. Davis, Yeovil, for Begonias.

To Mr. J. Charlton, Tunbridge Wells, for hardy flowers.

To Messrs. Barr & Son, Covent Garden, for hardy flowers.

Bronze Banksian Medal.

To Messrs. H. Cannell & Sons, Swanley, for double Begonias.

First Class Certificate.

To *Nymphæa Marliacea albida* (votes, unanimous), from Leopold de Rothschild, Esq., Gunnersbury House (gr. Mr. Hudson). Flowers large, white, guard petals suffused with pink.

To *Platanus occidentalis argentea variegata* (votes, unanimous), from Mr. J. Russell, Richmond. A very ornamental hardy tree. The pale green foliage is deeply cut and heavily splashed and suffused with silvery grey.

Award of Merit.

To *Nymphæa Ellisiana* (votes, 10 for, 1 against), from Leopold de Rothschild, Esq., Acton (gr. Mr. Hudson). A beautiful variety, with small deep crimson flowers and conspicuous golden-yellow stamens.

To *Salvia bicolor* (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford (gr. Mr. Bain). A very distinct species from Morocco. It forms a vigorous-growing plant with branching spikes of pale blue flowers, with a white lip.

To *Calochortus Plummeræ aureus* (votes, unanimous), from W. H. Wallace, Esq., Amory, China. A very handsome variety with deep yellow flowers, the base of the petals being covered with clear yellow hairs.

To Carnation 'Violet Douglas' (votes, unanimous), from Mr. J. Douglas, Great Bookham. The ground colour of this lovely variety is sulphur yellow, striped and margined with rosy pink.

To Carnation 'Sir Henry Irving' (votes, unanimous), from Mr. J. Douglas. Deep crimson flowers of moderate size and good form.

To Carnation 'Pelagia' (votes, unanimous), from Mr. J. Douglas. Flowers large, bright scarlet, flaked with slate.

To Carnation 'Badminton' (votes, unanimous), from Mr. J. Douglas. Flowers, sulphur yellow edged with deep pink.

To Lobelia tenuior grandiflora (votes, 8 for), from Mr. B. Ladhams, Southampton. A distinct variety of slender habit with light blue flowers.

To Tea Rose 'Sylph' (votes, 11 for), from Messrs. W. Paul & Son, Waltham Cross. A fine variety with delicate pink flowers of good form.

To Begonia 'Miss Griffiths' (votes, unanimous), from Mr. Davis, Yeovil. A magnificent variety, with large double white flowers slightly shaded with pink.

Botanical Certificate.

To Aristolochia Brasiliensis (votes, unanimous), from A. Kingmill, Esq., Harrow Weald.

Other Exhibits.

Leopold de Rothschild, Esq., Gunnersbury House (gr. Mr. Hudson), sent a beautiful collection of water Lilies.

C. F. Thompson, Esq., Penhill Close, Cardiff, sent a seedling Gaillardia.

From Mr. J. Douglas, Great Bookham, came a large collection of Carnations.

Mr. J. Fairbairn, Carlisle, sent two new Godetias.

Messrs. W. Paul & Son, Waltham Cross, staged a small collection of Roses.

Messrs. B. S. Williams & Son, Upper Holloway, sent Carnation 'Queen of Yellows.'

From Messrs. R. Veitch & Son, Exeter, came a group of new and little-known hardy shrubs.

Mr. H. Eckford, Wem, sent six new varieties of Sweet Peas.

Mr. H. W. Weguelin, St. Marychurch, Torquay, sent some Carnations.

Mr. H. G. Smyth, Goldsmith Street, Drury Lane, sent a large bunch of Carnation 'Jim Smyth.'

Messrs. A. W. Young & Co., Stevenage, staged a group of hardy flowers.

Prizes.

Class 3.—Twelve bunches of hardy flowers; distinct kinds. Amateurs: Prize, £2, to Mr. C. Herrin, Dropmore, Maidenhead.

Class 4.—Eight bunches of hardy flowers; distinct kinds. Amateurs. Prize, £1. 10s., to Miss Debenham, St. Peters, St. Albans.

FLORAL COMMITTEE, JULY 14, 1897. AT CHISWICK.

W. MARSHALL, Esq., in the Chair, and ten members present.

Awards Recommended :—

Award of Merit.

To Sweet Pea 'Countess Cadogan' (votes, unanimous), from Mr. Eckford, Wem. Large flowers of great substance; colour light lavender blue, shaded with mauve on reverse of standard.

To Sweet Pea 'Prince of Wales' (votes, unanimous), from Mr. Eckford. A bright rose self, of intense colour; fine bold form, large, three and frequently four flowers borne on long stout stems.

To Sweet Pea 'Lady Mary Currie' (votes, unanimous), from Mr. Eckford. Flowers deep orange pink, delicately shaded with rosy mauve.

To Lantana hybrida (votes, unanimous), from R.H.S. Plant of bushy habit with ovate, rough, serrated dark green leaves, and clusters of orange-scarlet flowers thrown well above the foliage.

To Lantana 'Drap d'Or' (votes, unanimous), from R.H.S. Plant of dwarf habit; very free flowering; flowers rich canary yellow.

FLORAL COMMITTEE, JULY 27, 1897.

W. MARSHALL, Esq., in the Chair, and twenty members present.

Awards Recommended :—

Gold Medal.

To Mr. H. J. Jones, Lewisham, for a magnificent display of Begonias, Palms, Caladiums, and Ferns.

Silver-gilt Flora Medal.

To Mr. H. B. May, Upper Edmonton, for a very fine collection of varieties of Pteris.

Silver Flora Medal.

To Mr. T. S. Ware, Tottenham, for hardy flowers.

To Messrs. R. Hartland & Son, Cork, for double Begonias.

To Messrs. Kelway & Son, Langport, for Gladiolus and hardy flowers.

To Messrs. H. Cannell & Sons, Swanley, for cactaceous plants.

Silver Banksian Medal.

To Messrs. J. Veitch & Sons, Chelsea, for hardy flowering shrubs.

To Messrs. Barr & Son, Covent Garden, for hardy flowers.

To Messrs. Paul & Son, Cheshunt, for Roses and hardy flowers.

To Messrs. Hugh Low & Co., Clapton, for Lilies.

Bronze Banksian Medal.

To Messrs. W. Paul & Son, Waltham Cross, for a small group of Roses.

Award of Merit.

To Gladiolus 'General Duchesne' (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. Bain). A vigorous growing variety, with large handsome flowers; colour carmine, striped with crimson and blotched with creamy white on the lower segments.

To Croton Shuttleworthii (votes, 6 for, 4 against), from Mr. J. Bugg, Eastgate House, Lincoln. A graceful variety with long, narrow, twisted green and yellow leaves, with a bright red midrib.

To Godetia 'Gloriosa' (votes, unanimous), from Messrs. Dobbie & Co., Rothesay. A very free-flowering variety of dwarf, compact habit. Flowers large, cup-shaped, deep rich crimson.

To Gladiolus 'Carlton' (votes unanimous), from Messrs. Kelway & Son, Langport. Flowers large and of good form, carmine, blotched and feathered with white on the lower segments.

To *Gladiolus* 'J. G. Clarke' (votes, unanimous), from Messrs. Kelway & Son. Flowers large rosy purple, the lower segments blotched with creamy white.

To *Pelargonium* (zonal) 'Anna Bateson' (votes, 13 for), from Mr. Gilbert Davidson, Ammanford, South Wales. Plant of dwarf compact habit, with double salmon-pink flowers freely produced.

To *Hibiscus* *cœlestis* (votes, unanimous), from Messrs. J. Veitch & Sons, Chelsea. A beautiful hardy free-flowering shrub. Flowers large, blue, centre deep crimson.

To *Hibiscus* 'Painted Lady' (votes, unanimous), from Messrs. J. Veitch & Sons. Flowers large, single, blush white, with a crimson centre.

To *Veronica* 'La Séduisante' (votes, unanimous), from Messrs. J. Veitch & Sons. A free-flowering hardy (?) shrub with bronze-green foliage and large spikes of deep purple flowers.

To Tea Rose 'G. Narbonnand' (votes, 15 for), from Messrs. W. Paul & Son, Waltham Cross. A distinct variety with large pale pink flowers.

To *Phlox* 'Lord Raleigh' (votes, unanimous), from Messrs. Paul & Son, Cheshunt. Bluish-purple flowers of moderate size, and borne in dense trusses.

To *Phlox* 'Événement' (votes, unanimous), from Messrs. Paul & Son, Cheshunt, and Mr. Forbes, Hawick. A very handsome variety with large trusses of salmon-rose flowers.

To *Heliopsis* *Pitcheriana* (votes, 10 for, 2 against), from Messrs. Paul & Son. A free-flowering variety with large bright yellow flowers.

To *Rosa* *rugosa atropurpurea* (votes, unanimous), from Messrs. Paul & Son. Flowers rich crimson, produced in clusters with exceptional freedom.

To *Canna* 'Elsie Perkins' (votes, 8 for, 4 against), from Messrs. Paul & Son. Plant of dwarf habit, with small pale yellow flowers.

To *Phlox* 'Bouquet de St. Cyr' (votes, unanimous), from Messrs. Barr & Son, Covent Garden, and Mr. Forbes, Hawick. A free-flowering variety of dwarf habit. Large white flower with a rosy crimson eye.

Other Exhibits.

Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. Bain), staged a collection of Gladioli and Pentstemons.

H. S. Bartleet, Esq., Shooter's Hill, sent Sweet Pea 'Pauline.'

The Duke of Marlborough, Blenheim Palace, Woodstock (gr. Mr. Whillans), sent four seedling Carnations.

Mrs. Chilton, Wealdstone, Middlesex, sent *Mesembryanthemum Bolonsi*.

From Major Howey, The Grange, Woodbridge, came Begonia 'Melton Beauty.'

E. Hibbert, Esq., Ashby St. Ledgers, Rugby, sent a seedling Carnation.

Mr. A. W. Edwards, Elmeslae Gardens, Stamford, sent Carnations.

Messrs. Atlee Burpee & Co., Philadelphia, U.S.A., sent pot plants of their new Sweet Pea 'Pink Cupid.'

Messrs. J. Cheal & Sons, Crawley, sent a group of Dahlias.

Messrs. W. J. Stokes & Son, Trowbridge, sent an everlasting Pea named 'Her Majesty,' which the Committee considered to be the same as 'Delicata.'

From Messrs. Hurst & Son, Houndsditch, came specimens of everlasting Pea 'Pink Beauty.'

Messrs. F. Sander & Co., St. Albans, sent a group of *Watsonia Ardernei*.

Prize.

Class 3.—Collection of cactaceous plants. Amateurs. Prize, Silver Flora Medal, to W. P. Bodkin, Esq., Westhill Place, Highgate.

FLORAL COMMITTEE, JULY 27, 1897. AT CHISWICK.

W. MARSHALL, Esq., in the Chair, and ten members present.

Awards Recommended:—

Award of Merit.

To Phlox 'Beatrice' (votes, unanimous), from M. Lemoine, Nancy, and Mr. Forbes, Hawick. Plant of dwarf bushy habit, very free flowering. Flowers borne in large trusses, rose pink suffused with salmon.

To Phlox 'Coquelicot' (votes, unanimous), from Mr. Forbes. A magnificent variety with large orange-scarlet flowers with a deeper eye. This Phlox was considered by some to be better even than 'Etna.'

To Phlox 'Beranger' (votes, unanimous), from Mr. Forbes. An exceptionally free-flowering variety of dwarf bushy habit. Flowers rose pink, shaded with violet.

To Phlox 'Torpilleur' (votes, unanimous), from Mr. J. Forbes. Plant of dwarf habit, very free flowering. Flowers borne in immense panicles; colour rosy carmine, deeper centre.

To Canna 'Corsaire' (votes, unanimous), from Messrs. Vilmorin, Paris. Foliage bronze green. Flowers large, deep orange Scarlet.

To Canna 'Alemannia' (votes, unanimous), from Messrs. Dammann, Italy. Plant of sturdy habit, producing fine spikes of very large flowers; colour brownish crimson, with a wide irregular margin of golden yellow.

To Canna 'Stadtrath Heidenreiet' (votes, unanimous), from Mr. Pfitzer, Stuttgart. Vigorous grower, with bronze-green foliage. Rich orange scarlet-flowers borne on long spikes.

To Canna 'Hofgartendirector Lanche' (votes, unanimous), from Mr. Pfitzer. Plant of dwarf habit, with immense flowers borne in large trusses, orange red spotted with crimson, and irregularly margined with canary yellow.

To Canna 'Doyen Jean Leopold' (votes, unanimous), from Messrs. Vilmorin. Plant of dwarf sturdy habit, with large and finely formed flowers borne on very stout spikes; petals very broad, canary yellow spotted with pale brown.

To Canna 'Edward Mieg' (votes, unanimous), from Messrs. Vilmorin. Plant dwarf, very free flowering, large and of good form; colour scarlet, shaded with orange.

To Canna 'America' (votes, unanimous), from Messrs. Dammann. Foliage bronze green. Flowers orange, shaded with crimson.

To Pentstemon 'President Carnot' (votes, unanimous), from Mr. J. Forbes, Hawick. Plant of vigorous habit, very free flowering. Flowers large, rosy crimson, throat blush white A grand variety.

To Pentstemon 'George Ulrich' (votes, unanimous), from

Mr. J. Forbes. Flowers of moderate size, fiery scarlet with a white throat.

To Pentstemon 'Sandorff' (votes, unanimous), from Mr. J. Forbes. Plant of very bushy habit. Flowers borne on stout spikes with exceptional freedom, mauve with a white throat.

Commended.

To Pentstemon 'Cassiope' (votes, unanimous), from R.H.S. Flowers of moderate size, rosy purple, crimson throat, upper segments blush white.

FLORAL COMMITTEE, AUGUST 10, 1897.

W. MARSHALL, Esq., in the Chair, and fifteen members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Kelway & Son, Langport, for a collection of Gladioli and Gaillardias.

To Messrs. J. Veitch & Sons, Chelsea, for a very fine display of Annuals—Tagetes, Godetias, Linums, Clarkias, Calliopsis Asters, &c.

Silver Flora Medal.

To Mr. M. Prichard, Christchurch, for hardy flowers.

To Mr. S. Mortimer, Farnham, for Show, Fancy, and Cactus Dahlias.

To Mr. T. S. Ware, Tottenham, for hardy flowers.

Silver Banksian Medal.

To Sir Trevor Lawrence, Bart., Burford (gr. Mr. Bain), for Cannas and Gladioli.

To Messrs. R. Wallace & Co., Colchester, for Lilies, Montbretias, and Gladioli.

To Messrs. Hugh Low & Co., Clapton, for Cannas, Lilies, and Statice Butcheri.

To Messrs. Barr & Sons, Covent Garden, for hardy flowers.

To Mr. J. Walker, Thame, for Show and Cactus Dahlias.

Bronze Flora Medal.

To Messrs. Dobbie & Co., Rothesay, for a group of Marigolds.



FIG. 73.—*CALCEOLARIA ALBA*. (*Gardeners' Chronicle*.)

First Class Certificate.

To *Calceolaria alba* (votes, unanimous), from J. T. Bennett-Poë, Esq., Homewood, Cheshunt (gr. Mr. Downes). Plant of bushy habit with small deep green linear opposite leaves, and pure white flowers borne very freely in cymes at the apex of the growths. Fig. 73.

To *Nymphæa Marliacea flammea* (votes, unanimous), from J. T. Bennett-Poë, Esq., Cheshunt (gr. Mr. Downes). Flowers very large, deep crimson, guard petals shaded with rose.

To *Crinum Powellii album* (votes, unanimous) from Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. Bain). A magnificent variety with large pure white funnel-shaped flowers borne in umbels. Hardy in a sheltered position.

Award of Merit.

To *Gladiolus* 'G. A. Kuijk' (votes, unanimous), from Sir Trevor Lawrence, Bart., Dorking (gr. Mr. Bain). Flowers very large, purple, throat white streaked with crimson.

To *Verbena* 'Tresserve' (votes, unanimous), from J. T. Bennett-Poë, Esq., Cheshunt (gr. Mr. Downes). Rose-coloured flowers in large trusses.

To *Gladiolus* 'Countess Amy' (votes, unanimous), from Messrs. Kelway & Son, Langport. Flowers large, rich rose with white blotches on the lower petals.

To *Gladiolus* 'Mike Lambourne' (votes, unanimous), from Messrs. Kelway & Son. A very handsome deep crimson variety.

To *Gladiolus* 'Countess of Leicester' (votes, unanimous), from Messrs. Kelway & Son. Exceptionally large flowers, white feathered with rose pink.

To *Rudbeckia laciniata* 'Golden Glow' (votes, 5 for, 4 against), from Mr. M. Prichard, Christchurch; Messrs. Kelway & Son, Langport; and Messrs. Barr & Son, Covent Garden. A vigorous growing variety with deep yellow double flowers.

To *Phlox* 'Eugène Danzanvilliers' (votes, unanimous), from Messrs. Kelway & Son. A dwarf free-flowering variety; lilac, with a white eye.

To *Cactus Dahlia* 'Daffodil' (votes, unanimous), from Mr. J. Stredwick, Silverhall Park, St. Leonards. Soft yellow flowers of moderate size with long narrow florets.

To *Cactus Dahlia* 'Agnes Box' (votes, unanimous), from Mr.

J. Stredwick. Rich crimson flowers of good form, petals broad and sharply pointed.

To Phlox 'La Mathilde' (votes, unanimous), from Mr. T. S. Ware, Tottenham. The flowers of this late blooming variety are of moderate size and of a distinct shade of purplish violet.

To Hollyhock 'Leander' (votes, unanimous), from Messrs. Webb & Brand, Saffron Walden. Flowers large and well formed, soft yellow suffused with pink.

Other Exhibits.

F. W. Moore, Esq., Botanic Garden, Glasnevin, sent a berried spray of *Pyrus Hostii*.

Mr. W. Dolling, Whitehill, Newton Abbot, sent seedling Dahlias.

From Mr. A. Hookings, Aldown House, Almondsbury, came a Carnation named 'Mrs. Tudway.'

Messrs. J. Veitch & Sons, Chelsea, sent sprays of hardy trees and shrubs.

Messrs. J. Cheal & Sons, Crawley, staged Cactus and Pompon Dahlias.

From Messrs. A. W. Young & Co., Stevenage, came a group of Carnations, Gloxinias, and Asters.

FLORAL COMMITTEE, AUGUST 19, 1897. AT CHISWICK.

W. MARSHALL, Esq., in the Chair, and four members present.

Awards Recommended :—

Highly Commended.

To *Ageratum americanum compactum* 'The Zoo' (votes, unanimous), from R.H.S. Plant of bushy habit; exceptionally free flowering. The large heads of light blue flowers are very enduring.

To *Calliopsis nigra nana* (votes, unanimous), from Messrs. Watkins & Simpson. See page 302.

Also to the following bedding *Pelargoniums* :—

(1) Golden Tricolor—'Masterpiece.'

(2) Silver Tricolor—'Dolly Varden.'

(3) Golden Bronze—'Zulu,' 'Golden Harry Hieover,' 'Maréchal Macmahon.'

(4) Silver-leaved—'Miss Kingsbury,' 'Boule de Neige,'
'Flower of Spring.'



FIG. 74.—*FICUS RADICANS VARIEGATA*. (*Gardeners' Chronicle*.)

(5) Yellow-leaved—'Creed's Seedling.'

(6) Green-leaved—'Sir Hamilton,' 'Mrs. Barmy,' 'Albion,'
'Triomphe de Stella,' 'Henry Jacoby,' 'Raspail Improved,'

'Adolphe Brisson,' 'Mad. Roechlin Schwartz,' 'Boule de Neige,'
'Advancer,' 'Captain H. Colville.'

A descriptive Report on Pelargoniums will appear when the trial is completed.

FLORAL COMMITTEE, AUGUST 24, 1897.

W. MARSHALL, Esq., in the Chair, and fourteen members
present.

Awards Recommended :—

Silver Gilt Flora Medal.

To Messrs. J. Laing & Sons, Forest Hill, for a group of Caladiums, Crotons, Gloxinias, Palms, and Ferns.

Silver Flora Medal.

To Purnell Purnell, Esq., Woodlands, Streatham Hill, for foliage and flowering plants.

To Mr. T. S. Ware, Tottenham, for Cactus and Pompon Dahlias.

To Messrs. R. Wallace & Co., Colchester, for Lilies, Montbretias, and Gladioli.

Silver Banksian Medal.

To Messrs. J. Veitch & Sons, Chelsea, for a collection of hardy Ericas.

First Class Certificate.

To *Ficus radicans variegata* (votes, unanimous), from Mr. W. Bull, Chelsea. Fig. 74. See page lxxv.

Award of Merit.

To Cactus Dahlia 'Night' (votes, unanimous), from Mr. J. Stredwick, Silver Hill Park, St. Leonards. A very handsome variety with large deep maroon flowers.

To Cactus Dahlia 'Amber' (votes, unanimous), from Mr. J. Stredwick. Large yellow flowers, guard petals flushed with pale orange.

To Show Dahlia 'Marjorie' (votes, unanimous), from Mr. C. Turner, Slough. Large bronzy-yellow flowers, tipped and suffused with light purple.

To Pompon Dahlia 'Hypatia' (votes, 7 for, 2 against), from Mr. C. Turner. Small terra cotta flowers, shaded with salmon.

To Pompon Dahlia 'Phryne' (votes, unanimous), from Mr. C. Turner. A very distinct variety with orange flowers tipped with scarlet.

To Pompon Dahlia 'Vesta' (votes, 8 for, 1 against), from Mr. C. Turner. Pure white flowers of good form and excellent quality.

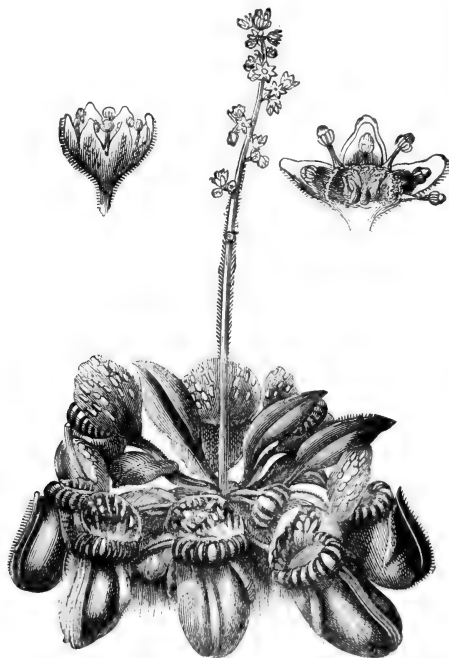


FIG. 75.—*CEPHALOTUS FOLLICULARIS*. (*Journal of Horticulture*.)

Other Exhibits.

Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. Bain), sent blooms of *Clematis Davidiana*.

G. H. McCulloch, Esq., Dissington Hall, Northumberland, sent ten seedling Carnations.

F. D. Lambert, Esq., Moor Hall, Cookham (gr. Mr. Fulford), sent a very fine yellow-flowered *Hibiscus*.

Jacob Wakefield, Esq., Sedgwick House, Kendal (gr. Mr. Ireland), sent flowers of a very fine seedling *Dipladenia*.

Mr. J. H. Cox, Railway Terrace, Feltham, exhibited Pompon Dahlia 'Golden Victoria.'

Mr. C. Bennett, Havant, sent Cactus Dahlias.

Messrs. W. Paul & Son, Waltham Cross, staged a small group of Roses.

From Mr. J. Green, Dereham, came nine new Cactus Dahlias. The Committee asked to see these again.

Mr. G. Harris, Scads Hill, Orpington, sent a group of Show Dahlias.

FLORAL COMMITTEE, SEPTEMBER 7, 1897.

W. MARSHALL, Esq., in the Chair, and fifteen members present.

Awards Recommended :—

Silver Gilt Flora Medal.

To R. J. Measures, Esq., Cambridge Lodge, Camberwell (gr. Mr. Chapman), for a fine collection of Sarracenias and Cephalotus. Fig. 75.

To Messrs. J. Veitch & Sons, Chelsea, for a group of Hardy Shrubs and Nepenthes, amongst the latter being a grand plant of N. Rajah. Fig. 76. See also pp. 226–262.

Silver Flora Medal.

To A. Pears, Esq., Spring Grove House, Isleworth (gr. Mr. Farr), for Crotons.

To Mr. Knight Eames, Twickenham, for Eucharis amazonica.

To Messrs. J. Cheal & Sons, Crawley, for Dahlias.

Silver Banksian Medal.

To Mr. J. Walker, Thame, for Dahlias.

Bronze Banksian Medal.

To Messrs. Barr & Son, Covent Garden, for hardy flowers.

To Mr. T. S. Ware, Tottenham, for hardy flowers.

First Class Certificate.

To Nepenthes Tiveyi (N. Veitchii ♂ N. Curtisii superba ♀) (votes, unanimous), from Messrs. J. Veitch & Sons, Chelsea. The

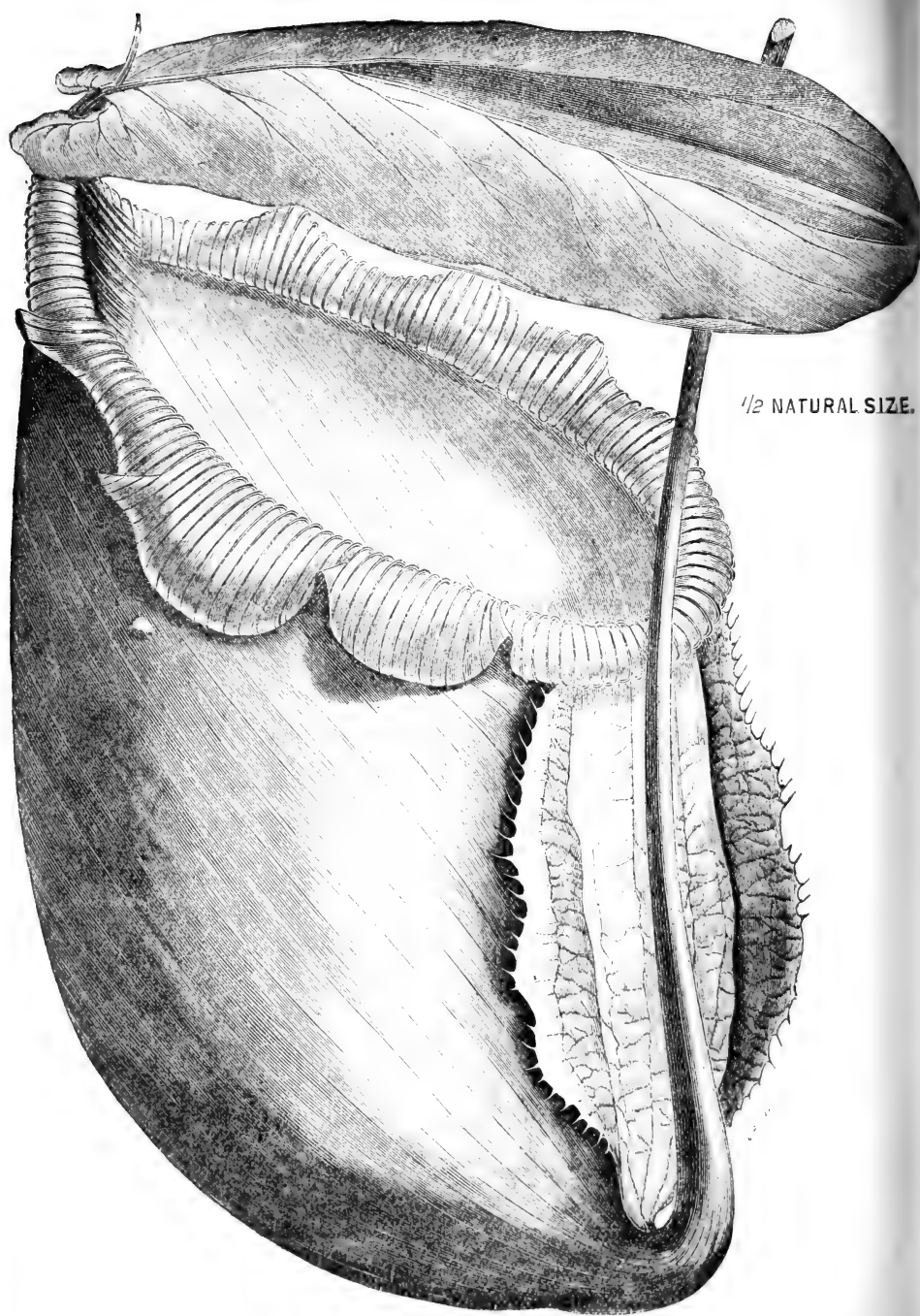


FIG. 76.—*NEPENTHES RAJAH* (HOOK. f.).

large yellowish-green pitchers are heavily streaked and blotched with dull crimson. Fig. 53, page 246.

Award of Merit.

To Hibiscus 'Manihot' (votes, 9 for), from F. D. Lambert, Esq., Moor Hall, Cookham (gr. Mr. Fulford). An old-fashioned annual, with large clear yellow flowers.

To Aster (Michaelmas Daisy) 'Mrs. W. Peters' (votes, unanimous), from Mr. W. Peters, Givan's Grove, Leatherhead. Plant of very dwarf bushy habit; flowers large and white, with a prominent yellow disc.

To Cactus Dahlia 'F. C. Pawle' (votes, 7 for), from Messrs. J. Cheal & Sons, Crawley. Flowers scarlet, tipped with purple.

Other Exhibits.

Sir Trevor Lawrence, Bart., Burford (gr. Mr. Bain), sent Anemones, Pentstemons, and Lobelias and some new crested Begonias. Fig. 77.

Mrs. Sydney Williams, Hindhead, Hazlemere, sent several seedling Pelargoniums.

Mrs. Wingfield, Ampthill House (gr. Mr. Empson), sent Codæum (Croton) interruptum elegans aureum.

From Mr. A. Smith, Lyminster, Arundel, came blooms of Daturas.

Mr. W. J. Godfrey, Exmouth, sent two varieties of Chrysanthemums.

Messrs. W. Cutbush & Son, Highgate, sent a group of Nerine Fothergilli major.

Mr. R. Owen, Maidenhead, staged a group of Cannas.

Mr. W. Wells, Earlswood, Redhill, sent Chrysanthemum 'Henri Yvon.'

Mr. J. K. Tranter, Henley-on-Thames, sent Dahlias.

Messrs. Dobbie & Co., Rothesay, sent French Marigolds.

From Messrs. Goos & Koenemann, Nieder-Walluf, came two new and very promising varieties of Dahlias.

Mr. W. Green, Garforth, Leeds, sent a pink Lobelia.

Mr. T. Lowton, Ospringe House, Faversham, sent plants of Primula obconica fimbriata. The Committee asked to see this again.

From Mr. E. J. Reid, Beckenham, came three varieties of Cannas.

Mr. E. F. Such, Maidenhead, sent Cactus Dahlias.

FLORAL COMMITTEE, SEPTEMBER 8, 1897. AT CHISWICK.

W. MARSHALL, Esq., in the Chair, and five members present.

Awards Recommended :—

Highly Commended.

To hybrid sweet-scented leaf Pelargoniums :—

1. 'W. Marshall.' A very fine variety, of dense growth, with finely cut foliage, and a blackish zone down the centre of each segment.

2. 'C. Jeffries.' Plant of dwarf bushy habit; leaves broad, the central portion heavily blotched with dark bronze.

3. 'Richard Dean.' Plant of dwarf bushy habit. The light green much-divided leaves are beautifully crimped at the edges. This would form a very useful table plant.

4. 'George Stevens.' A vigorous bushy grower, with large deep green leaves crimped at the edges.

5. 'H. B. May.' Of tall, good habit, with large light green pinnatifid leaves, each segment having in a young state a bronzy zone, which disappears with age.

6. 'J. D. Pawle.' Tall, and of good habit, with broad green pinnatifid leaves beautifully crimped at the edges.

These varieties were selected as being the best of a very large number of seedlings raised at Chiswick by crossing *P. crispum* with the more vigorous forms.

Also to the following annual Asters :—

(i.) Dwarf Victoria, bright rose tipped with white. (ii.) 'Lilliput,' rose. (iii.) Imbricated pompon crown, rose. (iv.) Imbricated pompon, rose. (v.) 'Mignon,' white. (vi.) Giant Comet, 'The Bride.' (vii.) Dwarf Chrysanthemum, shining brick rose and white. See page 299.

Commended.

To African Marigold 'Lemon,' and African Marigold 'Orange.'

For descriptions, see Report on Annuals, page 299.

FLORAL COMMITTEE, SEPTEMBER 17, 1897. AT CHISWICK.
W. MARSHALL, Esq., in the Chair, and nine members present.

Awards Recommended:—

Award of Merit.

To *Matricaria* 'Golden Ball.' See page 305.



FIG. 77.—A CRESTED BEGONIA. (*Gardeners' Chronicle*.)

To early flowering Chrysanthemums. *See page 287.*

(i.) 'L'Ami Condorcet.' (ii.) 'Longfellow.' (iii.) 'Mychett White.'

Highly Commended.

To early flowering Chrysanthemums :—

(i.) 'White St. Croats.' (ii.) 'Madame Jolivart.' (iii.) 'Madame Desgranges.' (iv.) 'Golden Fleece.' (v.) 'Madame Marie Masse.' (vi.) 'Little Bob.' (vii.) 'Mrs. Hawkins.' (viii.) 'G. Wermig.' (ix.) 'Strathmeath.' (x.) 'Miss Davis.' (xi.) 'Mrs. Cullingford.' (xii.) 'Flora.' (xiii.) 'Mr. Selly.' (xiv.) 'Mrs. Burrell.' (xv.) 'Nanum.' (xvi.) 'Toreador.' (xvii.) 'Blushing Bride.' (xviii.) 'Canari.' (xix.) 'Piercy's Seedling.' (xx.) 'Bronze Blushing Bride.' (xxi.) 'Madame Gastellier.' (xxii.) 'Edith Syrratt.' (xxiii.) 'Dodo.' (xxiv.) 'Madame Louis Lionnet.' (xxv.) 'Anastasia.' (xxvi.) 'Petillant.' (xxvii.) 'Madame Eulalie Morel.' (xxviii.) 'Salter's Early Blush.'

Also to annual Asters :—

(i.) 'Lilliput,' white, rose centre. (ii.) 'Ball Jewel,' scarlet and copper. *See page 299.*

FLORAL COMMITTEE, SEPTEMBER 21, 1897.

W. MARSHALL, Esq., in the Chair, and sixteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. J. Burrell & Co., Cambridge, for a large group of Gladioli and Cactus Dahlias.

Silver-gilt Banksian Medal.

To Messrs. W. Paul & Son, Waltham Cross, for a group of Roses.

To Mr. T. S. Ware, Tottenham, for Cactus Dahlias.

Silver Flora Medal.

To Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. J. Hudson), for a very fine group of *Salvia splendens grandiflora* and a collection of Dahlias.

To Earl Percy, Syon House, Brentford (gr. Mr. G. Wythes),

for a group of *Chrysanthemum* 'Lady Fitzwigram,' and *Lilium Harrisii*.

To Mr. J. H. Witty, Nunhead Cemetery, for early flowering *Chrysanthemums*.

To Messrs. J. Veitch & Sons, Chelsea, for a collection of Asters, Anemones, Tritomas, and Sunflowers.

To Mr. C. Turner, Slough, for Cactus and Pompon Dahlias.

To Messrs. H. Jones & Son, Shrewsbury, for Dahlias arranged for effect.

To Messrs. J. Cheal & Sons, Crawley, for Dahlias.

To Mr. S. Mortimer, Farnham, for Dahlias.

Silver Banksian Medal.

To Messrs. H. Cannell & Sons, Swanley, for Dahlias.

To Mr. H. B. May, Upper Edmonton, for a group of *Salvia splendens grandiflora*.

To Mr. J. T. West, Tower Hill, Brentwood, for Dahlias.

To Messrs. Paul & Son, Cheshunt, for hardy flowers.

To Messrs. J. Laing & Sons, Forest Hill, for foliage and flowering plants.

Bronze Banksian Medal.

To Mr. E. Such, Maidenhead, for early flowering *Chrysanthemums*.

To Mr. G. Humphries, Kington Langley, Chippenham, for Dahlias.

To Messrs. J. Peed & Sons, West Norwood, for Crotons, *Dracænas*, *Begonias*, &c.

First Class Certificate.

To *Apera arundinacea* (votes, unanimous), from Messrs. J. Veitch & Sons, Chelsea. A very ornamental grass, growing about 2 feet in height, with small pale green leaves and loose, slender, drooping plumes which measure about 3 feet 6 inches in length.

To *Retinospora obtusa sulphurea* (votes, 6 for, 5 against), from Messrs. J. Veitch & Sons, Chelsea. A graceful variety of vigorous habit, the young growths brightly yellow.

Award of Merit.

To Cactus Dahlia 'Miss Finch' (votes, unanimous), from

Messrs. J. Cheal & Sons, Crawley. Large crimson flowers, outer petals suffused with purple.

To Cactus Dahlia 'Mrs. John Goddard' (votes, unanimous), from Messrs. J. Cheal & Sons. Large bright crimson-scarlet flowers.

To Pompon Dahlia 'Maluma' (votes, unanimous), from Mr. C. Turner, Slough. A pretty variety, with deep yellow flowers.

To Cactus Dahlia 'Casilda' (votes, unanimous), from Messrs. J. Burrell & Co., Cambridge. Sulphur-yellow flowers tipped with orange.

To Cactus Dahlia 'Falka' (votes, unanimous), from Messrs. J. Burrell & Co. A very handsome crimson-maroon variety.

To Cactus Dahlia 'Salmon Queen' (votes, unanimous), from Messrs. J. Burrell & Co. Large salmon-pink flowers with orange centre.

To Cactus Dahlia 'Arachne' (votes, unanimous), from Messrs. Keynes, Williams & Co., Salisbury. A very distinct variety; white edged and suffused with orange-scarlet.

To Cactus Dahlia 'Laverstock Beauty' (votes, unanimous), from Messrs. Keynes, Williams & Co. Large dusky orange-salmon flowers.

To Cactus Dahlia 'Mary Service' (votes, unanimous), from Messrs. Keynes, Williams & Co. A very handsome variety, with long pointed petals, yellow ground, suffused and tipped with reddish salmon.

To Cactus Dahlia 'Keynes' White' (votes, unanimous), from Messrs. Keynes, Williams & Co. A very fine variety, with large pure white flowers.

To Phlox 'Miss Pemberton' (votes, 9 for, 1 against), from Messrs. Paul & Son, Cheshunt. Plant of dwarf habit, very free flowering; salmon-pink flowers in large trusses, crimson eye.

To Crassula Cooperi (votes, unanimous), from Messrs. Paul & Son. A very useful carpet-bedding plant, growing only 4 inches in height. The small bright red flowers are produced with great freedom.

To Cactus Dahlia 'Green's Gem' (votes, unanimous), from Mr. John Green, Dereham. A distinct variety, with large orange-salmon flowers.

To Cactus Dahlia 'Island Queen' (votes, unanimous), from

Mr. J. T. West, Tower Hill, Brentwood. Rosy-lilac flowers of medium size and excellent form.

To Pompon Dahlia 'Nellie Broomhead' (votes, unanimous) from Mr. J. T. West. Deep mauve with a lighter shade at base of the petals.

To *Primula obconica fimbriata* (votes, 9 for), from Mr. T. Lawton, Faversham. A large-flowered form of *P. obconica*, with fimbriated edges.

To Pompon Dahlia 'Minnie Richards' (votes, unanimous), from Mr. T. S. Ware, Tottenham. Flowers blush white.

To Show Dahlia 'Muriel Hobbs' (votes, unanimous), from Mr. T. Hobbs, Eastern House, St. Mark's Road, Bristol. Large canary-yellow flowers tipped with orange.

To Show Dahlia 'Harbinger' (votes, unanimous), from Mr. G. St. Pierre Harris, Orpington. Lilac-pink flowers of medium size.

To *Dracæna Russelli* (votes, 9 for), from Mr. J. Russell, Richmond. A very graceful variety, with long, narrow, arching bronze-green leaves. A beautiful table plant.

Other Exhibits.

A. E. Truckell, Esq., Myrtle Cottage, Maxwelltown, Dumfries, sent blooms of a new variety of *Lilium auratum*. The flowers had not travelled well, and the Committee asked to see it again in better condition.

From F. W. Moore, Esq., Botanic Garden, Glasnevin, came specimens of *Lonicera Sullivanti* in fruit.

John Chandler, Esq., Nyn Park, Potter's Bar, sent Show Dahlia 'Mrs. Kidstone.'

B. W. Currie, Esq., Coombe Warren, Kingston (gr. Mr. W. Allen), sent a very dwarf *Alternanthera*.

Messrs. R. Veitch & Son, Exeter, exhibited *Fuchsia triphylla* *superba*.

From Mr. P. Fry, Addington, West Malling, Kent, came several hybrid *Fuchsias* of much promise.

Mr. W. J. Godfrey, Exmouth, staged *Chrysanthemums*.

Mr. John Green, Dereham sent *Dahlias*.

Mr. W. Potten, Cranbrook, sent two new zonal *Pelargoniums*.

From Mr. M. Cuthbertson, Rothesay, came specimens of *Helianthus rigidus* 'Daniel Dewar.' The Committee asked to see this again.

Mr. M. Russell, Farnboro', sent *Chrysanthemum* 'Mychett White,' which had been certificated at Chiswick. See p. 296.

ORCHID COMMITTEE.

JUNE 15, 1897.

HARRY J. VEITCH, Esq., in the Chair, and fourteen members present.

Awards Recommended:—*Silver Flora Medal.*

To Messrs. Jas. Veitch & Sons, Chelsea, for a group of Orchids in which were fine examples of *Zygo-colax* × *Veitchii*, *Epiphrontis* × *Veitchii*, *Lælio-Cattleya* × *Hippolyta*, and other remarkable Hybrids.

First Class Certificate.

To *Vanda* × 'Miss Joaquim' (*V. teres* × *V. Hookeriana*) (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. H. White). This was the first appearance of this fine hybrid, which was raised in Singapore. Flowers, of the rich rose colour of *V. teres*, and similar in size to that species, but the labellum approached *V. Hookeriana* in form. Fig. 78.

Award of Merit.

To *Cattleya Mossiæ* 'In Memoriam Richard Curnow' (votes, unanimous), from Messrs. Hugh Low & Co., Clapton. A very large and richly coloured variety.

To *Odontoglossum crispum* *Crawshayanum* (votes, unanimous) from de B. Crawshay, Esq., Sevenoaks (gr. Mr. S. Cooke). Sepals white, tinged with rose, and blotched with brown, petals white, fringed, and bearing a large irregular blotch of brown. Lip white, yellow at the base, and bearing numerous brown spots.

To *Lælio-Cattleya* × *Dominiana* var. 'Empress' (*L. purpurata* *Brysoniana* × *C. Dowiana*) (votes, unanimous), from Messrs. F. Sander & Co., St. Albans. Sepals and petals deep rose, veined with purple; lip rich velvety crimson.

To *Cattleya Mossiæ* 'Empress of India' (votes, unanimous), from Messrs. F. Sander & Co. A large flower with a very bright purplish-crimson lip.

To *Lælio-Cattleya* × 'Our Queen' (votes, 9 for, 3 against), from Messrs. F. Sander & Co. A pretty hybrid of unrecorded

parentage. Sepals and petals white, lip cream-white with a purple blotch in the centre.

Botanical Certificate.

To *Geodorum Augusti*, from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White).

To *Angræcum carpophorum*, from Sir Trevor Lawrence, Bart.

Other Exhibits.

Sir Frederick Wigan, Clare Lawn, East Sheen (gr. Mr. W. H. Young), showed *Lælio-Cattleya* × *Canhamiana* var. 'Iolanthe'; L-C. × *orphanum*; *Cattleya Mossiæ* 'Mrs. Egerton Grey,' *Epidendrum Medusæ*, *Cymbidium tigrinum*, *Miltonia vexillaria candida*, &c.

H. J. Elwes, Esq., Colesborne, Andoversford (gr. Mr. Lane), showed *Disa* × *Kewensis* 'Colesborne var.,' much dwarfer than the original.

Pandeli Ralli, Esq., Alderbrook, Cranleigh (gr. Mr. Barks), sent *Meiracyllium gemma*.

Frau Ida Brandt, Riesbach, Zurich (gr. Mr. Schlecht), sent *Pescatorea cerina*, *Odontoglossum maculatum*, &c.

R. I. Measures, Esq., Cambridge Lodge, Camberwell (gr. Mr. H. J. Chapman), sent *Lælia purpurata Ernestii*, a very pretty light form; *L. tenebrosa superba*; and *Miltonia vexillaria* 'Cambridge Lodge' var.

H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Aldous), showed a fine white *Anguloa* approaching *A. eburnea* as *A. Pittiana*.

ORCHID COMMITTEE, JUNE 29, 1897.

HARRY J. VEITCH, Esq., in the Chair, and fifteen members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Jas. Veitch & Sons, Chelsea, for a very fine group of Orchids, both species and hybrids.

Silver Banksian Medal.

To Messrs. Hugh Low & Co., Clapton, for a group of *Cattleya Mossiæ*, and other Orchids.

First Class Certificate.

To *Lælio-Cattleya* × *Eudora* *superba* (*C. Mendelii* ♂ *L. purpurata* ♀) (votes, unanimous), from Messrs. James Veitch & Sons. A very fine hybrid of the *L.-C.* × *eximia* class, with flowers having the sepals and petals white, tinged and veined with rose; the front purplish-crimson.



FIG. 78.—*VANDA* × *MISS JOAQUIM*. (*Gardeners' Chronicle*.)

Award of Merit.

To *Cypripedium* × 'Mrs. E. V. Low' (votes 10 for, 1 against), from Messrs. Hugh Low & Co., Clapton. A very pretty hybrid supposed to be of *C. niveum* parentage on the one side. Flowers white, slightly tinged with green, and having light-

purple spots on the petals and upper sepal. The lip was laterally compressed and exhibited a ridge in front.



FIG. 79.—*EPILAELIA* × *RADICO-PURPURATA*. (*Gardeners' Chronicle*.)

Cultural Commendation.

To T. B. Haywood, Esq., Woodhatch, Reigate (gr. Mr. Salter), for *Miltonia vexillaria* 'Daisy Haywood,' a large pure white form previously certificated.

Other Exhibits.

Messrs. F. Sander & Co., St. Albans, showed *Sobralia* × *Veitchii*, *S.* × *Amesiae*, and other Orchids.

Fred Hardy, Esq., Tyntesfield, Ashton-on-Mersey (gr. Mr. T. Stafford), showed *Cattleya Mossiæ Wageri*, the white *C. M. Hardyæ*, *Lælia tenebrosa Charlesworthii*, *Lælio-Cattleya* × *Arnoldiana*, &c.

R. I. Measures, Esq., Cambridge Lodge, Camberwell (gr. Mr. H. J. Chapman), sent *Cypripedium leucochilum grandiflorum*, and *C. × Salus*, a hybrid of *C. concolor*, with greenish-yellow flowers slightly tinged with lilac.

Mr. N. Blandford, Bitterne, Southampton, showed *Cattleya Warscewiczii* with an almost entirely purple lip.

Mr. H. A. Tracey, Twickenham, sent flowers of fine forms of *Cattleya Mendelii*.

The Rev. F. Paynter, Stoke Hill, Guildford, sent *Phaius* × (*Humblotii* × *bicolor*), resembling a small *P. × Cooksonii*.

ORCHID COMMITTEE, JULY 13, 1897.

HARRY J. VEITCH, Esq., in the Chair, and twelve members present.

Awards Recommended:—

Award of Merit.

To *Lælio-Cattleya* × *Canhamiana* var. *albida* (*L. purpurata* × *C. Mossiæ*) (votes, unanimous), from Messrs. Jas. Veitch & Sons, Chelsea. Sepals and petals white, with a very faint pink tint. Lip broad, the front of a dark crimson purple.

To *Epidendrum nemorale* (votes, 9 for), from Frau Ida Brandt, Brunnenhof, Riesbach, Zurich (gr. Mr. Schlecht). A fine inflorescence of the major form of this handsome old Mexican species was shown.

To *Phaius* × *Ashworthianus* (*Mannii* × *maculatus*) (votes, 8 for), from Messrs. F. Sander & Co., St. Albans. A distinct hybrid, with yellow flowers, slightly tinged with green; and with conspicuous brown markings on the lip.

Other Exhibits.

Messrs. Jas. Veitch & Sons showed *Lælio-Cattleya* × *Eunomia* (*L. pumila* × *C. Gaskelliana*), *L.-C. × Zephyra* (*L. xanthina* × *C. Mendelii*), plants of *Disa* × *Veitchii*, &c.

Frau Ida Brandt, Zurich, sent cut spikes of *Epidendrum*

Brassavolæ, *E. radiatum*, *E. atropurpureum* Randii, *Phalænopsis violacea*, *Phaius Humblotii*, *Utricularia Endresii*, &c.

Elijah Ashworth, Esq., Harefield Hall, Wilmslow, Cheshire (gr. Mr. Holbrook), showed *Cattleya* × *Mardelli*, *Cattleya superba alba*, *C. Eldorado Wallisii*, varieties of *C. Warscewiczii*, and a flower of the blue-tinted *Dendrobium* 'Victoria Regina.'



FIG. 80.—*DENDROBIUM* 'VICTORIA REGINA.' (*Gardeners' Chronicle*.)

Messrs. F. Sander & Co., St. Albans, showed *Cypripedium* × 'Svend Bruun' (*Lowii* × *Curtisii*), *C.* × 'Mulus' (*hirsutissimum* × *Lawrenceanum*), *C.* × *orphanum*, and *C.* × 'Euryale.'

ORCHID COMMITTEE, JULY 27, 1897.

HARRY J. VEITCH, Esq., in the Chair, and thirteen members present.

Awards Recommended:—

Silver Flora Medal.

To Elijah Ashworth, Esq., Harefield Hall, Wilmslow,

Cheshire (gr. Mr. Holbrook), for a fine collection of cut spikes of *Cattleya Warscewiczii*, *C. Rex*, and *C. Mendelii*.

First Class Certificate.

To *Epilælia* × *radico-purpurata* (*Epidendrum radicans* ♂ *Lælia purpurata* ♀) (votes, 8 for, 3 against), from Messrs. Jas. Veitch & Sons, Chelsea. A most remarkable hybrid, showing the peculiarity of having the habit of growth and other features of the pollen parent, as previously remarked in instances where *Epidendrum radicans* has been the male. The inflorescence bore three flowers, two abnormal and one perfect. Sepals lanceolate, petals ovate acute, both of a light orange-scarlet; lip broadly ovate, obscurely three-lobed, yellow at the base, outer portion light reddish-purple. Fig. 79.

Award of Merit.

To *Cattleya Warscewiczii* 'Mrs. E. Ashworth' (votes, unanimous), from Elijah Ashworth, Esq., Harefield Hall, Wilmslow, Cheshire. A very distinct and pretty variety, with blush-white flowers, showing no other colour than a yellow tinge at the base of the lip, and a minute rose-purple blotch at its apex.

Other Exhibits.

Messrs. Jas. Veitch & Sons showed a small group of hybrid Orchids, among which were *Phalænopsis* × 'Hebe' (*Sanderiana* × *rosea*), *Lælio-Cattleya* × 'Clonia,' *Cattleya* × 'Atlanta,' and *Sobralia* × *Veitchii*.

Messrs. Hugh Low & Co., Clapton, showed specimens of *Cattleya Warscewiczii*, *C. Gaskelliana* 'Sunray,' *Bulbophyllum* species, and hybrid *Cypripediums*.

Messrs. F. Sander & Co., St. Albans, showed *Angræcum Eichlerianum*, *Miltonia vexillaria rubella melanocentra*, *Vanda Hookeriana*, and *Masdevallia Gargantua*.

Frau Ida Brandt, Riesbach, Zurich (gr. Mr. Schlecht), sent an interesting collection of Orchids.

J. H. Kitson, Esq., Elmet Hall, Leeds (gr. Mr. Bonsall), showed *Cypripedium leucochilum*.

Major Joicey, Sunningdale Park, Sunningdale (gr. Mr. Fred J. Thorne), showed varieties of *Odontoglossum Schlieperianum* and *O. aspidorhinum*.

J. F. Ebner, Esq., Beckenham (gr. Mr. A. Waite), sent *Cypripedium* × *Chapmanii* (*bellatulum* × *Curtisii*).

ORCHID COMMITTEE, AUGUST 10, 1897.

HARRY J. VEITCH, Esq., in the Chair, and sixteen members present.

Awards Recommended :—*Bronze Banksian Medal.*

To Messrs. Hugh Low & Co., Clapton, for a group of Cattleyas, Odontoglossums, &c.

Award of Merit.

To *Odontoglossum Pescatorei* Harrisianum (votes, 7 for, 1 against), from Messrs. James Veitch & Sons, Chelsea. The plant bore a fine branched spike of white flowers, spotted on the sepals and petals with purple.

To *Lælio-Cattleya* \times *elegans* var. *Schroderiana* (votes, 9 for, 5 against), from Elijah Ashworth, Esq., Harefield Hall, Wilmslow, Cheshire (gr. Mr. Holbrook). One of the darkest in colour of any of the L.-C. \times *elegans* Turneri class. Flowers almost wholly dark crimson-purple, the lip brighter in tint than the other segments.

To *Dendrobium* 'Victoria Regina' (votes, unanimous), from Thomas Statter, Esq., Stand Hall, Whitefield, Manchester (gr. Mr. R. Johnson). Flowers about 1 inch across, the outer halves of the segments purplish-blue, the remainder white. Bearing some resemblance to *D. sanguinolentum*, though quite distinct from it. Fig. 80.

To *Cypripedium* \times *callo-Rothschildianum* (*callosum* \times *Rothschildianum*) (votes, 8 for, 4 against), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. Davis). A fine hybrid, with a general resemblance to *C.* \times *Massaianum*, which was also shown.

Cultural Commendation.

To Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. H. White), for a splendid plant of *Platyclinis filiformis*, with ninety-four flower spikes.

Botanical Certificate.

To *Epidendrum* (*Nanodes*) *Matthewsii*, from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White).



FIG. 81.—GRAMMATOPHYLLUM SPECIOSUM. (*Gardeners' Magazine*.)

Other Exhibits.

Messrs. F. Sander & Co., St. Albans, sent an interesting group of Orchids.

Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. H. White), showed *Masdevallia infracta purpurea*, with many flowers; and the rare *Eulophia guineensis*.

Sir Frederick Wigan, Clare Lawn, East Sheen (gr. Mr.

W. H. Young), sent several spikes of *Lælio-Cattleya* × *elegans* cut from the same plant; spikes of *Lælia crispa* and *Masdevallia macrura*.

J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. Davis), showed *Cypripedium* × *Massaianum*, C. × 'A. de Lairese,' and C. × 'Neptune,' for comparison with C. × *callo-Rothschildianum*, they being of the same class; also *Renanthera Storiei*.

G. W. Law-Schofield, Esq., New-Hall-Hey, Rawtenstall (gr. Mr. Shill), sent a distinct light form of *Lælio-Cattleya* × *elegans*.

W. H. Lumsden, Esq., Balmedie, Aberdeenshire (gr. Mr. Roberts), sent a *Cypripedium* reputed to be between C. *Stonei* and C. *Fairieanum*, but which bore a strong resemblance to C. *Stonei*, and no trace of C. *Fairieanum*, though evidently a hybrid, but not of the parentage recorded.

R. I. Measures, Esq., Cambridge Lodge, Flodden Road, Camberwell (gr. Mr. H. J. Chapman), showed a good form of *Lælio-Cattleya* × *Andreana* (L.-C. × *elegans* × C. *bicolor*).

Reginald Young, Esq., Sefton Park, Liverpool (gr. Mr. Poyntz), sent *Cypripedium* × *Eyeranianum* var. 'Hermione.'

Messrs. Jas. Veitch & Sons showed *Lælio-Cattleya* × *callistoglossa ignescens*, and two distinct forms of L.-C. × 'Clonia.'

ORCHID COMMITTEE, AUGUST 24, 1897.

HARRY J. VEITCH, Esq., in the Chair, and eleven members present.

Awards Recommended:—

Gold Medal.

To Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. H. White), for a magnificent example of *Grammatophyllum speciosum*, the flower spike being over 7 feet in length. It was the first specimen ever shown. Flowers dull yellow, thickly dotted with reddish-purple spots. Figs. 81 and 82.

Silver Banksian Medal.

To Messrs. James Veitch & Sons, Chelsea, for an effective group of Orchids.

First Class Certificate.

To *Grammatophyllum speciosum* (votes, unanimous), from
Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Figs. 81, 82.



FIG. 82.—GRAMMATOPHYLLUM SPECIOSUM—Basal flower, male. (*Gardeners' Chronicle.*)

Award of Merit.

To *Lælio-Cattleya* × 'Juno' (*C. Mossiæ* × *L. majalis*) (votes, unanimous), from Norman C. Cookson, Esq., Oakwood, Wylam, Northumberland (gr. Mr. W. Murray). A singular hybrid, with pale rose-lilac flowers; the base of the lip cream white, marked with yellow.

To *Goodyera Rollissonii* (votes, unanimous), from Mr. William Bull, King's Road, Chelsea. An old but rare variety with olive-green leaves, variegated with golden yellow.

To *Lælio-Cattleya* × *Andreana* (*L.-C.* × *elegans* × *C. bicolor*) (votes, unanimous), from R. I. Measures, Esq., Cambridge Lodge, Camberwell (gr. Mr. H. J. Chapman). A singular hybrid, with pale rose sepals and petals, and elongated purple lip.

Other Exhibits.

C. L. N. Ingram, Esq., Elstead House, Godalming (gr. Mr. T. W. Bond), showed *Lælio-Cattleya* × 'Radiance' (*L. purpurata* var. × *C. Dowiana*); *L.-C.* × 'Ruby Gem' (*C. Lawrenceana* × *L.-C.* × *elegans*); and *Cypripedium* × *gracile* (*Haynaldianum* × *Swanianum*).

Messrs. Hugh Low & Co., Clapton, showed hybrid Orchids.

Messrs. F. Sander & Co., St. Alban's, sent *Lælio-Cattleya* × *Sanderæ*, *L.-C.* × 'Robin Measures,' and other *Lælio-Cattleyas*.

R. I. Measures, Esq. (gr. Mr. H. J. Chapman) showed *Masdevallia trinema* (Lowii).

ORCHID COMMITTEE, SEPTEMBER 7, 1897.

HARRY J. VEITCH, Esq., in the Chair, and eleven members present.

Awards Recommended:—*Silver Flora Medal.*

To Messrs. James Veitch & Sons, Chelsea, for a very fine group of Orchids, remarkable by the presence of a large number of hybrid *Cattleyas* and *Lælia-Cattleyas*.

To Fred Hardy, Esq., Tyntesfield, Ashton-on-Mersey (gr. Mr. T. Stafford), for a small group of rare Orchids.

First Class Certificate.

To *Cattleya* × 'Euphrasia' (superba ♂ Warscewiczii ♀) (votes, unanimous), from Messrs. James Veitch & Sons. A remarkably fine hybrid with well-formed flowers, of good substance, and of a rich rose-purple colour, the front lobe of the lip being of the intense purplish crimson seen in the best forms of *C. Warscewiczii*.



FIG. 83.—*LÆLIA PUMILA* 'GATTON PARK' VARIETY. (*Gardeners' Chronicle*.)

Award of Merit.

To *Rhyncostylis cœlestis*, 'Cambridge Lodge' variety (votes, unanimous), from R. I. Measures, Esq., Cambridge Lodge, Camberwell. A very distinct variety, with dark violet labellum, and lighter violet markings on the tips of the other segments.

Botanical Certificate.

To *Brassia Lawrenceana longissima*, from Messrs. James Veitch & Sons.

To *Acineta Barkeri*, from Major Joicey, Sunningdale Park, Sunningdale, Berks (gr. Mr. Fred. J. Thorne).

To *Oncidium panduratum*, Rolfe, from Welbore S. Ellis, Esq. Hazelbourne, Dorking (gr. Mr. S. Barrell).

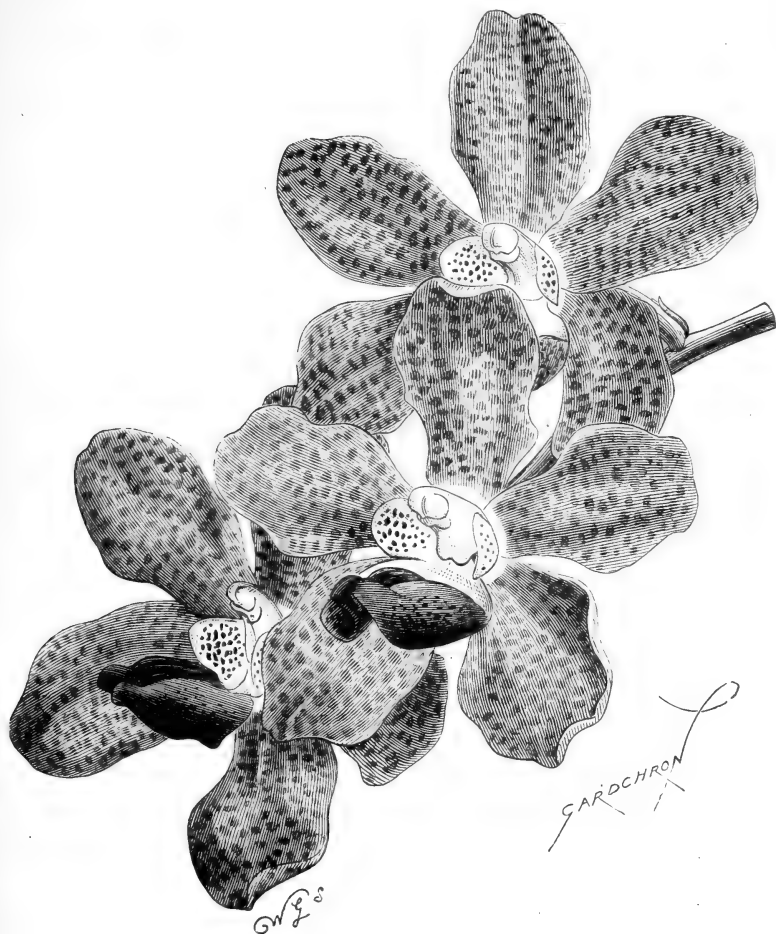


FIG. 84.—*VANDA AMENA*. (*Gardeners' Chronicle*.) ..

Other Exhibits.

Thos. Statter, Esq., Stand Hall, Whitefield, Manchester (gr. Mr. R. Johnson), showed *Cypripedium* × *triumphans*

(Sallieri Hyeanum \times ænanthum superbum), C. \times 'Lady Isobel' (Rothschildianum \times Stonei), and C. \times 'Lord Derby' (Rothschildianum \times superbiens).

Messrs. F. Sander & Co. showed hybrid Cypripediums *Maxillaria striata*, &c.

Mrs. Harris, Lamberhurst (gr. Mr. S. Huggins), showed *Cattleya* \times 'Miss Harris' (*Mossiae* \times *Schilleriana*).

Messrs. Hugh Low & Co., Clapton, sent *Cattleya* \times 'Minucia' (*Loddigesii* \times *Warszewiczii*), *Cypripedium* \times 'Alfred Hollington,' and other *Cypripediums*.

C. L. N. Ingram, Esq., Elstead House, Godalming (gr. Mr. T. W. Bond), showed *Lælia* \times *splendens* (*crispa* \times *purpurata*), interesting as demonstrating that this cross did not obtain L.-C. \times *Exoniensis*, to which it is very inferior. Also L.-C. \times *Andreana* (C. *bicolor* \times L.-C. \times *elegans* Turneri) as L.-C. \times 'Gazelle.'

A. W. Warburton, Esq., Vine House, Haslingden, Manchester (gr. Mr. T. Lofthouse), showed *Cypripedium insigne* 'Laura Kimball,' a fine yellow form near to C. *insigne* Sanderianum.

Messrs. James Veitch & Sons showed *Cattleya* \times 'Melpomene' (*Mendelii* ♂ *Forbesii* ♀).

ORCHID COMMITTEE, SEPTEMBER 21, 1897.

HARRY J. VEITCH, Esq., in the Chair, and eleven members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Hugh Low & Co., Clapton, for an effective group of Orchids.

First Class Certificate.

To *Lælia pumila* 'Gatton Park' variety (votes, unanimous), from Jeremiah Colman, Esq., Gatton Park, Surrey (gr. Mr. King). A peculiar variety with white flowers, the sepals and petals of which were suffused with a decided blue tint. Front of the lip purplish blue. Fig. 83.

Award of Merit.

To *Vanda* \times *amœna* (nat. hyb. *V. Roxburghii* \times *V. cœrulea*)
(votes, unanimous), from Messrs. Linden, l'Horticulture Inter-



FIG. 85.—LYCASTE DENNINGIANA. (*Gardeners' Chronicle*.)

ationale, Brussels. Flowers intermediate between those of the supposed parents. Sepals and petals of a peculiar light greyish-blue, with numerous violet spots, lip violet-blue. Fig. 84.

To *Miltonia* × *Peetersiana* (votes, 6 for, 4 against), from R. I. Measures, Esq., Cambridge Lodge, Camberwell (gr. Mr. H. J. Chapman). The original record supposed this to be between *M. spectabilis* Moreliana and *M. Clowesii*. The plant shown was evidently *M. Regnelli* × *M. spectabilis* Moreliana. Flowers light purple, the lip being formed as in *M. Regnelli*.

To *Lycaste Denningiana* (votes, unanimous), from the Royal Botanic Gardens, Glasnevin, Dublin. Flowers of the *L. gigantea* class. Sepals and petals yellowish-green; lip large, reddish orange. Fig. 85.

To *Oncidium Papilio* (votes, unanimous), from D. M. Grimsdale, Esq., Kent Lodge, Uxbridge.

To *Cattleya* × *Hardyana* Lowiæ (votes, unanimous), from Messrs. Hugh Low & Co., Clapton. A large, well-formed, and richly coloured variety.

Other Exhibits.

W. S. McMillan, Esq., Ardenholme, Maghull, Liverpool (gr. Mr. W. G. Robertson), sent *Cattleya* × *Hardyana* alba, with white sepals and petals and purple-crimson lip veined with orange. The Committee considered it similar to *C. aurea* 'Mrs. Fred Hardy.'

Messrs. Collins & Collins, Cumberland Park, Willesden, sent *Odontoglossum Pescatorei* and one plant of *O. × excellens*.

Sir Frederick Wigan, Clare Lawn, East Sheen (gr. Mr. W. H. Young), sent *Houlletia Brocklehurstiana*.

Messrs. F. Sander & Co., St. Albans, staged a small group of Orchids, in which were good examples of *Dendrobium Griffithianum*, *D. Gratrixianum*, with a single white flower tinged with purple on the lip; *Miltonia* × *Lamarcheana*, *M. Bluntii* Lubbersiana, *Cypripedium bellatulum* album, *Cypripedium* × *Saundersianum*, *Odontoglossum grande*, &c.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

OCTOBER 12, 1897.

Mr. HARRY J. VEITCH, F.L.S., in the Chair.

Fellows elected (23).—H. T. Armitage, J. R. St. Barbe Baker, Mrs. D. Bartholomew, John Bentley, junr., H. Dunkin, H. F. Getting, Henry A. Hebler, Mrs. Heldmann, Rev. J. J. Johnstone, Lady Evelyn Mason, Henry J. Morison, Joseph M. Moore, Mrs. Parr, C. W. Payne, W. Potten, T. Russell, B.A., Mrs. Swinley, W. Sydenham, J. Vert, Miss Eunice Watts, John Williams, Mrs. Wrigley, H. Pasteur.

A lecture on "Some Curiosities of Orchid Breeding" was given by Mr. C. C. Hurst. (*See p. 442.*)

GENERAL MEETING.

OCTOBER 26, 1897.

Sir TREVOR LAWRENCE, Bart., in the Chair.

Fellows elected (4).—John C. Colvill, Alfred E. Leggett Walter Speed, C. Aubrey Watts.

The lecture announced for this meeting was postponed, and instead thereof, at 3 o'clock, the Victoria Medal of Honour, conferred by the Council in celebration of Her Majesty's Diamond Jubilee, was distributed to the sixty recipients by the President. (*See p. 571.*)

GENERAL MEETING.

NOVEMBER 9, 1897.

Dr. MAXWELL T. MASTERS, F.R.S., in the Chair.

Fellows elected (15).—Dr. Geo. Brodie, J. T. Campbell, J.P., Percy R. Dunn, Mrs. Arnold Herbert, Alfred A. Honey, James Jeffrey, Arthur G. Kendall, Mrs. Lumsden, Mrs. Brough Maltby, Charles Moon, J. C. Newsham, Hon. Mrs. Oakley, Lady D'Arcy Osborne, Lady de Ramsey, Miss Dorothy Renshaw.

A lecture on "Root Action," illustrated by lantern slides, was given by Professor F. W. Oliver, D.Sc., F.L.S. (*See* p. 486.)

GENERAL MEETING.

NOVEMBER 23, 1897.

Mr. JAMES DOUGLAS in the Chair.

Fellows elected (22).—Leonard Addenbrooke, William Wheatley Ball, Alfred Barker, J. Brice Bell, C. W. Bonyng, Charles E. Bretherton, George Elliott, Miss E. Helen Emmet, Fred Enock, R. Munro Ferguson, William Garton, junr., Mrs. Henry Jackson, Mrs. Kemeys-Tynte, Mrs. Kerrison, Mrs. J. E. Lascelles, R. S. Markendale, Alex. McLanchlin, Robt. Windsor Rickards, Countess of Selkirk, Mrs. Sheward, G. N. Stevens, Mrs. H. Yool.

A lecture on "Horticultural Exhibitions and Schedules" was given by Mr. John Wright, V.M.H. (*See* p. 499.)

GENERAL MEETING.

DECEMBER 14, 1897.

Mr. CHAS. E. PEARSON in the Chair.

Fellows elected (24).—T. Arnold, W. E. Austin, G. Shorland Ball, Mrs. C. Brandreth, William Thackhall Browett, Thomas L. Butler, Charles H. Cave, D. Livingstone Davies, James A. Gammie, Dowager Duchess of Kintore, Robert Maher, Miss Moon, Viscountess Newport, F. F. Paul, Charles Phillips, Richard Pryce, John Rutherford, M.P., Frank Thomas, W. F.

Thomas, Mrs. W. F. Thomas, H. J. Griffin, Major Weller, William Whitaker-Standing, E. Money Wigram.

A lecture on "Sporting in Chrysanthemums" was given by the Rev. Professor Henslow, M.A., V.M.H. (See p. 537).

SCIENTIFIC COMMITTEE.

OCTOBER 12.

Dr. MASTERS, F.R.S., in the Chair, and four members present.

Acorn Cups malformed.—Mr. French, of Felstead, sent specimens of this not uncommon phenomenon. It appears to be due to an arrest of the flower, probably by some insect attack, when the scales of the cup become enlarged and free, as in the Artichoke gall.

Melons with new Disease.—Specimens were received from Mr. J. Fraser Smith, of The Gardens, Cullen House, N.B., who writes as follows:—"The disease attacked my crop last year, and has again this, in both a sudden and deadly manner. An entire crop of twenty plants has perished in a few days. The disease first shows a spot on the leaf, then a part of the stem gets affected, and in two or three days the whole plant collapses. It is only at a certain time of the year, for the first crop in both years, which was grown in the same house, finished without any signs of it, *i.e.* about the early part of August; while the second crop, about half-grown on the opposite side of the path, has all gone, as also a later batch planted on the same side as the first ones. Out of thirteen plants ten went off in one day. Two young Cucumber plants have also died in the same way, after they were four feet high." The following report has been received from Kew:—"The Melon disease is caused by *Scolecotrichum melophthorum*, Prill., a parasitic fungus. The disease is common in France, but I am not aware of its having previously been observed in Britain. Burn all diseased plants, as if they be allowed to rot on the ground a recurrence of the disease would be almost certain next season. Under any circumstances it would be advisable not to use the same ground for Melon-growing for at least two years, as the fungus spores are probably abundant in the soil."

Parrot Tulips Seeding.—Mr. Wilks brought ripe pods and seeds of this variety, which he had crossed with the pollen from other kinds of Tulips growing in his garden. It had been stated by growers that the Parrot Tulip had not been known to bear seed at all, and Mr. Henslow observed that of some bulbs received from Mr. Barr, in every case the pistil was abortive. It is proposed to raise plants from the seed thus obtained.

Abies bracteata Cones.—Fine specimens were received from Mr. A. Harding, The Gardens, Orton Longueville, Peterborough. They were borne by one of the finest specimens of this species in England. The tree is a native of South California, growing in Santa Lucia, and is in danger of becoming extinct. The cones are remarkable for their long linear bracts.

Cedrela Toona fasciated.—A remarkable specimen, consisting of a spirally coiled, flattened branch, two of the coils being welded together, was exhibited by Dr. Masters. The specimen came from Dr. Franceschi, Santa Barbara, South California.

Abies balsamea.—A specimen was received from Mr. Noble of a young plant which had developed a globular tuber-like excrescence below the soil. Similar cases had occurred some years ago in the same grounds, but the cause is not traceable in the present stage of growth, though it may possibly be due to some injury by insects at a very early stage.

Juniper Berries gymnospermous.—Dr. Masters exhibited some berries of the common Juniper, received from Dr. Schröter, of Zurich, remarkable for the three coherent bracts not having become fleshy enough to close in upon the seeds, so that the latter remained visible, free, and strictly “gymnospermous,” as in the previous condition of the ovules.

Trapa natans, Fruit.—He also showed specimens of the Water Chestnut from the Lago di Muzzano, near Lugano, having four knobs upon them, which do not occur on the ordinary form of this fruit. Specimens of another variety, var. *Verbanensis*, were shown from the Lago Maggiore.

Spruce Fir-cone, var.—He also showed cones of a variety of *Picea excelsa* having smooth-rounded scales, instead of the usual form. Dr. Schröter, who gathered it in Switzerland, referred it to *Picea medioxima*; but Dr. Masters observed that

this variety is a dwarf alpine or arctic species, and regarded the specimen as a variety only of the Spruce.

Anthurium Spathe, Monstrous.—Colonel Beddome sent a specimen having three spathes, and the spadix commencing to branch, exhibiting a semi-proliferous condition.

Plants exhibited.—M. Lemoine sent a spray of *Tamarix kashgarica*, a variety of *T. hispida*, interesting as being a late-flowering species from Central Asia; *Panax sessiliflorum*, with large, dense bunches of black berries, probably from Japan; a sweet-scented *Begonia* having a delicate but very evanescent odour of lemon; and double and semi-double sports of *B. semperflorens*.

Galls on Roots of Oak.—Mr. Wilks brought remarkable galls forming a large mass on the roots of Oak or Chestnut. They are also found on the roots of the Deodar. The galls are polygonal and wedge-like, so forming together a globular cluster about the root. They are produced by *Cynips aptera*. (See *Gardeners' Chronicle*, 1841, p. 732, and 1874.)

SCIENTIFIC COMMITTEE, OCTOBER 26, 1897.

Dr. MASTERS, F.R.S., in the Chair, and seven members present.

Galls on Oak Roots.—With reference to the specimens exhibited at the last meeting, Mr. McLachlan observed that the name of the insect was now *Biorhiza aptera*, and that only one sex (the female) was known as occurring in the root-galls. As soon as it was hatched, the insect climbed to the terminal shoots and laid its eggs in the buds. The result was the common spongy gall, known as the Oak-apple. In this both male and female insects were produced, and were formerly thought to be a distinct genus, under the name of *Teras terminalis*. Both sexes fly down to the foot of the Oak and lay their eggs in the roots underground, and so reproduce the root-galls. This dimorphism is characteristic of other gall-insects on the Oak.

Sub-pelorian Cattleyas.—Mr. Veitch exhibited two sprays, carrying several flowers of *Cattleya labiata autumnalis*, having the two front sepals assuming the form of lips. He observed that the same plant had repeated the peculiarity both last year and this, but the lip-markings are now more pronounced. The

specimens were received from Mr. Frank Lloyd, of Coombe House, near Croydon.

Carnation Leaves malformed.—Mr. Douglas exhibited leaves with peculiar horn-like excrescences on the margins. It was suggested that they might be caused by acari. They were forwarded to Dr. Michael for investigation. Dr. Masters observed that a *Yucca* in the Botanic Gardens, Dublin, produced very similar structures every year.

Malformed Cauliflower.—Mr. Henslow exhibited a stalk bearing a cluster of short *Asparagus*-like shoots, the leaves being reduced to a bracteate form, suggestive of the name of Broccoli—viz. *Brassica oleracea* var. *Botrytis asparagoides*. Dr. Masters observed that it bore a very unusual appearance, really intermediate between a Cauliflower and a Wild Cabbage.

SCIENTIFIC COMMITTEE, NOVEMBER 9, 1897.

Dr. MASTERS, F.R.S., in the Chair, and five members present.

Cattleya labiata, Sport.—Dr. Masters observed that sports similar to those produced at the last meeting, in which two sepals were more or less resembling the labellum, had been sent to him from numerous localities this year. The species was introduced some fifty years ago, and subsequently lost; but it had been lately rediscovered in and introduced from Pernambuco.

Carnation Leaves with Horn-like Marginal Outgrowths.—Mr. Michael reported that no trace of acari could be seen, as suggested as a possible cause. Dr. Müller observed that a plant of *Solanum jasminoides* was covered all over with horn-like excrescences. Dr. Masters suggested that they were probably spongy outgrowths from the epidermis.

Stocks, &c., attacked by Beetles.—Mr. Michael observed that Stocks, Virginia Stocks, and Nasturtiums in his garden were attacked and utterly spoilt in a fortnight by thousands of beetles eating the flowers of the two former plants, but the leaves as well of the last named. They do not entirely kill the plants, which renew both leaves and flowers after the beetles have disappeared. A partial remedy was found in shaking the plants over a basin of hot water. It appears to

be *Phyllotreta atra*, one of the numerous "flea-beetles." Miss Ormerod, to whom they were sent, suggests "trying a mixture of equal parts of fresh gas-lime and quicklime, with a much smaller proportion of soot, and about half as much sulphur as of soot. These should be powdered up together very finely, well mixed, and dusted on to the foliage when the dew is on it, morning or evening. Just a sprinkling is enough. It usually acts well if applied as above so as to adhere to the beetles and foliage." She was under the impression, however, "that lime similarly applied would do equally well."

Ivy attacked by Dodder.—Mr. Chas. Herrin, of Dropmore, sent specimens of Ivy badly attacked by a *Cuscuta europæa*. He remarks: "This parasite has established itself on the west wall of our church, destroying the Ivy with which it is covered. It has been thoroughly destroyed, Ivy and all, once, a few years ago; but now that the Ivy has begun to grow nicely again, half covering the wall, it has again appeared, and is destroying it." As the seeds must germinate in the ground, or perhaps in the chinks in the wall as well, the aim must be to kill them before germinating. If the ground by the wall received a good dressing of slaked lime, it might prove effective.

Cox's Orange Apple striped.—Mr. G. Swailes, of Beverley sent an Apple, mostly red, but striped with green on one side, the green colour being on the most exposed side. The cause was unknown. Dr. Masters suggested the possibility of accidental crossing having been the cause, for Darwin had described similar results in an Orange pollinated by a Lemon. (*An. and Pl. under Dom.* i. p. 399.) Mr. Wilks mentioned that a Beurré d'Amanlis Pear in his garden had thrown out a green striped sport, also a bough bearing golden foliage.

Gall on Jasmine.—Mr. Henslow exhibited a large globular gall which he had taken from the stem of this plant. As no fungus was present, it was sent to Mr. McLachlan for examination.

Composition of Potatos.—Professor Church gave some account of the recent researches of MM. Coudon and Bussard on the distribution of the constituents in Potatos. They found that a slice of a Potato revealed three zones. The external one beneath the epidermis contained 73 per cent. of water, the central holding about 80 to 84 per cent.; that the central part contained the

greater amount of nitrogen, the exterior the greater quantity of starch. This accounted for the "bursting" in a floury Potato, which is relatively more free from albuminoid matters. The cause of the interior portion being more consistent is that the starch cells though bursting are held together by the curdling of the albuminoid matters during cooking. The same peculiarities appear in the thirty-four varieties examined. The intermediate zone was also of an intermediate character with regard to its structure and cell-contents. It was to be regretted that the authors did not distinguish between the true albuminoids and the amides in estimating their percentage of nitrogenous matter. As a rule, the former amount to 1·3 in Potatoes, but they had estimated them from the total nitrogen as from 1·8 to 2·5. Dr. Masters remarked that these observations corresponded with the stem-structure of the Potato, in which the cortex was a starch-reservoir as it is in trees, while the deeper layers correspond with the phloem or proteid-holding sieve-tubes.

SCIENTIFIC COMMITTEE, NOVEMBER, 23, 1897.

Dr. MASTERS, F.R.S., in the Chair, and three members present.

Gall on Jasmine.—With reference to the specimen brought by the Secretary to the last meeting, Mr. MacLachlan reports that it is quite impossible to fix on anything in particular in the way of a cause, but the puncture of a *Phytoptus* is the most probable.

Phyllotreta on Cruciferae.—He also observed, with regard to the beetles shown by Mr. Michael as destructive to Stocks, &c., that "the genus is the one to which the 'Turnip-flea' belongs. There are about a dozen species in this country, all being much alike. They all frequent the *Cruciferae*, and the fact that this one was also found on *Tropæolum* only intensifies the fact that most things which feed on the former will also feed on the latter, as, *e.g.*, the larvæ of 'Cabbage whites,' the interpretation being that both contain the same chemical vegetable products."

Dahlia, Hybrid (?).—Flowers were received from E. J. Lowe, Esq., of Shirenewton Hall, Chepstow, supposed to be the result of crossing a *Dahlia* with the pollen of a *Sunflower*. The

appearance was that of a *Dahlia*, the disc alone being rather larger. Dr. Masters undertook to examine them more minutely.

Monstrous Cypripedium.—Mr. Veitch sent a plant of *C. sitius* bearing a single flower. It had no lip, but two columns. It was referred to Dr. Masters for further investigation.

The Copper-plant.—Dr. Masters exhibited an illustration of *Polycarpæa spirostylis*, F. von Mueller. It has the above name, as it is said only to grow where copper is to be found, and that its presence is an indication to miners of the existence of that metal in the neighbourhood. It is found by the mines of Watsonville, &c., N. Queensland.

Proliferous Chrysanthemum.—A specimen bearing three flowers was received from B. Greaves, Esq., of Broome Hall, Dorking. They were remarkable for consisting of a dense mass of minute heads instead of distinct florets. Some of the show *Chrysanthemums*, Dr. Masters observed, consisted of this peculiarity, the separate heads combining to make a single large "flower." The peculiarity is characteristic of the genus *Echinops*, only the individual heads contain but a single flower each.

SCIENTIFIC COMMITTEE, DECEMBER 14, 1897.

Dr. MASTERS, F.R.S., in the Chair, and five members present.

Cypripedium, Monstrous.—With reference to the specimen sent to the last meeting by Mr. Veitch, Dr. Masters reported that the lip was wanting, but the dorsal and ventral sepals as well as the lateral petals were normal; both stamens were present, but only two carpels, standing in an antero-posterior position.

Tuberous Growths on Vines.—Mr. S. T. Wright sent some gall-like structures taken from Vines in the large vinery at Chiswick. He observes that "many of the old and young rods are similarly malformed at their base. It does not appear to affect the health and vigour of the rods. In all the malformations grubs or maggots are present; but neither moths nor weevils have been seen in the house." Mr. Michael pronounced the grubs to be coleopterous, but they were not likely to have been the cause. Professor Church undertook to examine them chemically. There was no apparent structure in them beyond a mass of cellular tissue with a corky exterior surface.

Hellebores diseased.—Some badly diseased plants were received from Mr. F. W. Burbidge, Botanic Gardens, Dublin. They were submitted to Kew for examination. The report was as follows :—" *Phoma effusa*, Desm., is the name of the fungus attacking the Hellebores. The diseased portions should be removed and burned, as at this season the fungus is producing myriads of spores, which live as saprophytes on humus in the soil for some time before they are capable of acting as parasites. The Hellebore shoots of next year will be infected by these spores. The above alternation from a parasitic to a saprophytic mode of life enables the fungus possessing one form of fruit only, as in the present instance, to tide over the period during which its host-plant is not actively growing. Spraying with a solution of potassium sulphide (1 oz. to 3 gal. of water) when the leaves first appear next season would, to some extent, prevent the chances of inoculation from floating spores."

Holly with Red and Yellow Berries.—Mr. Ch. Turner, Slough, sent some sprays, on which he remarks : "They are cut from a large tree which retains its berries for two years. The berries are yellow in the first year, but change to red in the second year." As no seasonable break was distinguishable between the group of yellow and that of the red berries below it on the same stem, some doubt was expressed, and some further information desired. This Mr. Turner has kindly promised to furnish.

FRUIT AND VEGETABLE COMMITTEE.

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 12, 1897.

PHILIP CROWLEY, Esq., in the Chair, and twenty members present.

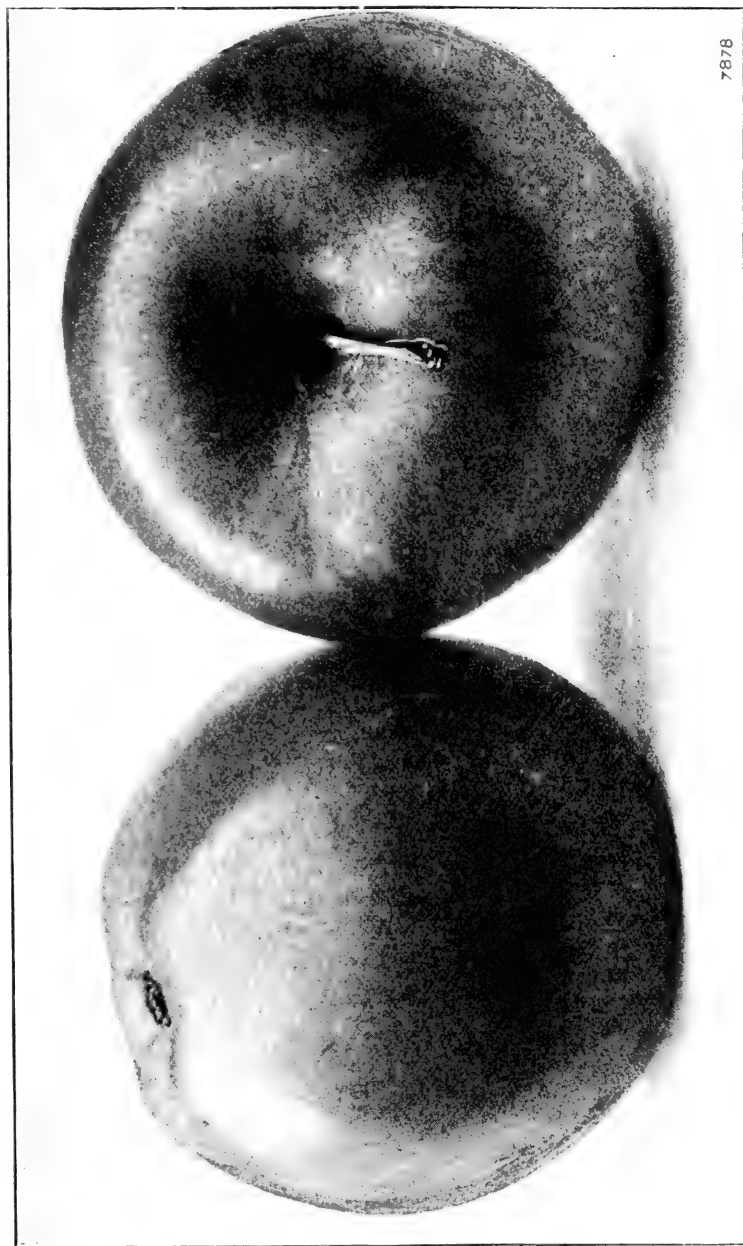
Awards Recommended :—

Gold Medal.

To Roger Leigh, Esq., Barham Court, Maidstone (gr. Mr. Woodward), for a magnificent exhibit of 100 dishes of Apples and Pears.

Silver Knightian Medal.

To John Warren, Esq., Handcross Park, Crawley (gr. Mr. Offer), for sixty dishes of Apples and Pears.



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FIG. 125.—APPLE 'JAMES GRIEVE.' (*Gardeners' Magazine*.)

To Messrs. Carter, High Holborn, for a very instructive exhibit of varieties of Cabbage.

Silver Banksian Medal.

To Lord St. Oswald, Nostell Priory, Wakefield (gr. Mr. John Easter), for a collection of Apples, showing how well they can be grown, with care, even in a smoke-laden atmosphere.

To the Dowager Lady Freake, Fulwell Park, Twickenham (gr. Mr. Rickwood), for a collection of Apples and Pears.

Bronze Knightian Medal.

To A. Young & Co., Stevenage, for Ornamental Gourds.

Award of Merit.

To Melon 'Croxteth Jubilee' (votes, 7 for, 3 against), from Lord Sefton (gr. Mr. Barham), Croxteth Park, Liverpool. Fruit of excellent flavour; slightly oval; skin yellow, slightly netted, deeply ribbed; flesh scarlet.

To Pear 'Directeur Hardy' (votes, 10 for, 1 against), from Messrs. Geo. Bunyard, Maidstone. Fruit of excellent flavour, somewhat suggestive of 'Chaumontel'; bluntly pyriform (peg-top shaped); short stalk with no depression; very small eye in very slight depression; skin brown and rough, with a red tinge on the sunny side. Tree of rigid growth and very fruitful.

To Apple 'James Grieve' (votes, unanimous), from Messrs. Geo. Bunyard, Maidstone. Fruit full of flavour, very tender and soft and juicy; small eye somewhat depressed; long slender stalk deeply inserted; skin pale yellow brightly flecked with crimson. The tree is said to be a very good and early cropper, and the fruit keeps well when ripe. It was raised from Cox's Orange by Messrs. Dickson, of Edinburgh. (Fig. 125.)

Other Exhibits.

Mr. Roger, Lodsworth, Sussex, sent a very pretty seedling Apple which did not, however, seem to belong to either the cooking or eating section.

Mr. F. Norman, Bengel Hill, Evesham, sent a seedling Apple which was too like Fearn's Pippin.

Mr. W. Pridmore, Hinckley, sent two seedling Apples, neither of which seemed of sufficient merit.

F. Graham Powell, Esq., Swanley, sent specimens of Bottle Fruit of excellent appearance.

E. Lord, Esq., Rawtenstall (gr. Mr. Wright), sent a supposed seedling Grape, having large bunches with very large long oval berries, each berry being almost green at the stalk end and passing gradually to almost black at the point. It was considered to be so like to 'Black Morocco' as to be practically indistinguishable from it.

Mr. B. Wells, Crawley, sent Apple 'Nouvelle Franc,' which, if it keeps well, was considered promising as a dessert Apple. In appearance it is like a highly coloured Lane's 'Prince Albert,' but with a shorter and more deeply inserted stalk. The flesh is, however, tenderer and whiter, and the flavour quite distinct. It was requested to be sent in December.

W. Lawrence, Esq., Elsfield, Hollingbourne (gr. Mr. Robinson), sent some very fine 'Hill's Prize' Runner Beans.

Mr. Thursby, Colchester, sent an Apple (Darcy Spice \times Keswick Codlin). It was very like 'Domino.'

Mr. J. Rolfe, Stanford-le-Hope, sent a new Tomato, very dark in colour, smooth and of good shape, but the flavour, perhaps owing to the lateness of the season, was not remarkable. It was ordered to be grown at Chiswick for trial.

Captain Carstairs, Welford Park (gr. Mr. Ross), sent Pears 'The Popham' and 'McKinley,' neither of which was ripe. Also Apple 'Opal,' which was thought too small for cooking purposes.

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 26, 1897.

PHILIP CROWLEY, Esq., in the Chair, and seventeen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To C. A. Bayer, Esq., Tewkesbury Lodge, Forest Hill (gr. Mr. Taylor), for a splendid collection of Grapes, including 'Foster's Seedling,' 'Mrs. Pince,' 'Gros Guillaume,' 'Gros Colmar,' 'Muscat of Alexandria,' 'Trebiano,' 'Lady Downes,' 'Alnwick Seedling,' 'Black Hamburgh,' and 'Alicante.'

To Messrs. Laing, Forest Hill, for 100 dishes of Apples and Pears.

To Messrs. Cheal, Crawley, for 100 dishes of Apples and Pears.

To Messrs. Cannell, Swanley, for a collection of Vegetables.

Bronze Banksian Medal.

To Messrs. Carter, High Holborn, for a collection of the varieties of Beet.

Award of Merit.

To Turnip 'Golden Ball' (votes, unanimous), from Messrs. Dobbie, Rothesay.

To Turnip 'Model White' (votes, unanimous), from Messrs. Dobbie.

To Melon 'Excelsior' (votes, 11 for), from Earl Percy, Syon House (gr. Mr. Wythes). Fruit quite round, beautifully netted, white flesh, excellent flavour.

To Grape 'Marchioness of Downshire' (votes, 10 for, 2 against), from the Marquis of Downshire, Hillsborough Castle, co. Down (gr. Mr. Bradshaw), raised from White Gros Colmar, fertilised with pollen of Muscat of Alexandria. A fine white Grape of excellent flavour and of good keeping qualities. Berries almost round.

Other Exhibits.

Messrs. Spratt, Vassal Road, Brixton, sent some Vegetable Marrows.

Messrs. Dobbie sent specimens of Parsley and Kale.

W. H. Evans, Esq., Forde Abbey (gr. Mr. Crook), sent a fine dish of Tomatos grown outdoors, and 2 dishes of late Plums 'Coe's Golden Drop' and 'Coe's late Red.'

From Chiswick came a Melon which had been grown from seed sent by Mr. Barr from Persia. The fruit was in appearance like a short fat Cucumber, of a greenish-yellow colour, and of very indifferent flavour, though juicy and refreshing.

Mr. John Beale, Shoreham, sent a seedling Apple.

Pear 'The Popham,' shown at the last meeting, was brought up from Chiswick. It somewhat resembled 'Duchesse d'Angoulême,' being sweet and juicy, but with a good deal of grittiness.

Mr. Veit, Audley End, Saffron Walden, sent Potato 'Diamond'

Jubilee,' which was ordered to be cooked at the Committee's next meeting at Chiswick.

Mr. Outram, Fulham, sent a dish of 'Royal Dutch' Medlar.

Mr. Dykes, Hubton Hall, Newark, sent a seedling Apple, which the Committee desired to see again in March.

Mr. B. Wright, Lyndon Hall, Oakham, sent a seedling Apple raised from 'Dumelow's Seedling,' of very pretty appearance.

Messrs. Garcia & Jacobs, of Covent Garden, sent three boxes of magnificent Pears, which they had imported from California, grown by A. Block, Esq., of Santa Clara. Amongst them were 'Doyenné du Comice,' 'Easter Beurré,' 'Beurré Clairgeau,' 'Winter Nelis,' 'Vicar of Winkfield' (known in America as 'Bon Curé'), 'Glou Morceau,' and 'Uvedale's St. Germain' (*syn.* 'Belle Angevine'). With the exception of the last, which is a cooking Pear, they were all of immense size and of superb flavour and quality, fully equal, if not superior, to any English-grown fruits. The Committee desired special thanks to be conveyed to Messrs. Garcia for their kindness in sending them.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 5, 1897.

AT CHISWICK.

H. BALDERSON, Esq., in the Chair and eight members present.

Awards Recommended :—

Highly Commended.

To seven Borecoles or Kales, viz. :—

1. Cuthbertson's strain.
2. Brydon's selected green curled.
3. Dobbie's Victoria.
4. Chou de Milan.
5. Cottagers.
6. Culzean Castle.
7. Late Hearting.

Commended.

To 'Dobbie's Dwarf Purple' Kale, *syn.* 'Exquisite Dwarf Purple Curled.'

To Potato 'Veit's Diamond Jubilee.'

To Potato 'Sutton's Supreme.'

The Committee tasted four varieties of Potatoes and examined forty-six stocks of Kales and Borecoles. (See p. 279.)

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 9, 1897.

PHILIP CROWLEY, Esq., in the Chair, and fifteen members present.

Awards Recommended :—

Silver Banksian Medal.

To Mr. W. Iggulden, Frome, for four baskets of magnificently coloured Gros Colmar Grapes.

To the Duke of Rutland, Belvoir Castle (gr. Mr. Divers), for thirty-two varieties of Pears in fine condition.

Bronze Banksian Medal.

To Messrs. Harrison, of Leicester, for a very interesting collection of varieties of Beet.

Other Exhibits :—

Earl Percy, Syon House (gr. Mr. Wythes), sent a new and promising autumn Cabbage, 'Wythes' St. Martin,' which had been sown on June 26, and was ready for use in the middle of October. It was requested to be tried at Chiswick.

Her Majesty the Queen, Windsor (gr. Mr. Owen Thomas), sent a new Cucumber 'Frogmore all the Year Round,' the result of a cross between 'Rochford's Market' and 'Dickson's All the Year Round.' The fruits were very even and fine, and the Committee were much impressed, but requested to see it in February.

Mr. Knowles, Woking, sent a seedling Pear, which was unfortunately quite rotten.

Messrs. Hartland & Son, Slough, Cork, sent an Apple, 'Munster Pippin,' a very high and angular fruit of the most beautiful crimson and gold colour and appearance, but distinctly unpleasing to the palate.

Mr. Swailes, of Beverley, sent a fruit of Cox's Orange Pippin, well coloured except for about a quarter of its surface, which

was almost absolutely greenish-white, and this part it was said had been towards the sun.

The Rev. Gordon Salmon, Overton, sent specimens of double budded Pears :—Pitmaston budded on Beurré de l'Assomption, Pitmaston on Winter Nelis, Pitmaston on Catillac, Pitmaston on Huyshe's Princess of Wales, Pitmaston on Autumn Bergamot, Pitmaston on Glou Morceau, Pitmaston on Thompson's, Pitmaston on Comice, Louise Bonne on Thomson's, Louise Bonne on Swan's Egg, Louise Bonne on Marie Louise, Beurré Diel on Marie Louise. The fruit had unfortunately been packed in strong-smelling hay, and had been a week on their journey, so that it was impossible to distinguish the variation in flavour (if any) caused by the double budding, and the Committee did not consider it wise to pronounce on a slight variation in form from inspection of single fruits only ; but they were greatly obliged to Mr. Salmon for so kindly sending them.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 23, 1897.

PHILIP CROWLEY, Esq., in the Chair, and fifteen members present.

Awards Recommended :—

Silver Banksian Medal.

To Lee Campbell, Esq., Glewston Court, Ross (gr. Mr. Bayford), for a collection of superb Apples.

To Lord Aldenham, Aldenham House (gr. Mr. Backett), for a collection of huge Onions.

To Messrs. Rivers, Sawbridgeworth, for six baskets of Apples.

Award of Merit.

To Grape 'Directeur Tisserand' (votes, unanimous), from Messrs. T. Rivers, Sawbridgeworth. The berries, though not large, are intensely black, oval, with a glorious bloom, of fine flavour for a late Grape, and have a skin so thick (though by no means an unpleasant one) that it was thought probable this variety might keep even later than Alicante, Gros Colmar, or Lady Downes. Whilst recommending an Award of Merit, the Committee thought that if it could be shown in as good condition in February or March, it might deserve a higher award.

To Apple 'Lady Falmouth' (votes 6 for, 4 against), from Mr. Geo. Chambers Mereworth. Fruit medium size to small, round, flat, eye in a shallow depression, very short stalk in a narrow opening. Of the type of 'Court Pendu Plat,' but with smoother skin, and the stalk not so much depressed. Flavour excellent, not unlike Fearn's Pippin. Colour very deep bright crimson. Of free growth and a good cropper. The wood and growth somewhat resembling 'Cox's Orange.'

Other Exhibits.

Messrs. Jeffries, Cirencester, sent an Apple 'Reinette Superfine,' which was considered too nearly identical with 'Anne Elizabeth.'

Mrs. Henry Jackson, Carshalton, sent two unnamed Apples: one was thought to be probably a seedling from 'Winter Hawthornden,' the other was quite unknown.

Mr. W. Batchelor, Oxbridge sent fruits of 'Cape Gooseberries.'

The Surrey Seed Co. sent a Potato which was ordered to be tried at Chiswick.

Mr. J. Grandfield, Acton, sent some Walnuts, in appearance exactly like smooth cobnuts, but of excellent flavour, and to a great extent lacking the bitter inside skin.

Messrs. Sander & Co., of St. Albans, sent specimen plants of a new dwarf French Bean bearing gigantic pods. It had been grown under glass, but it was suggested it would prove as hardy as other French Beans. It was requested that seed be sent to Chiswick.

Messrs. Rivers sent a White Grape named 'Gradiska,' very transparent and very firm in the flesh, but with little flavour.

Mr. T. Canning, Aldenham Park Gardens, Bridgenorth, sent a single specimen of an Apple he had grown from a pip out of one sent him from America. It was in appearance like a very fine 'Annie Elizabeth,' but it was considered of far better quality, and sweeter—in fact an excellent fruit. Mr. Canning was advised to cultivate it, and send six specimens if possible next year.

FRUIT AND VEGETABLE COMMITTEE, DECEMBER 14, 1897.

PHILIP COWLEY, Esq., in the Chair, and nineteen members present.

Awards Recommended :—

Silver Knightian Medal.

To Mr. H. Berwick, Sidmouth, for thirty-six dishes of beautiful Apples.

Silver Banksian Medal.

To the Earl of Galloway, K.T., Wigtonshire (gr. Mr. J. Day),



FIG. 126.—PEAR 'PRESIDENT BARABÉ.' (*Journal of Horticulture*.)

for twenty dishes of Apples. The fruit was greatly admired as coming from so far north.

To Mr. S. Mortimer, Farnham, for some boxes of very bright clean Tomatos.

Award of Merit.

To Pear 'President Barabé' (votes, 15 for), from Lord

Suffield, Gunton Park (gr. Mr. Allan). Eye very large and open, filling the entire depression which is very slight; stalk very short and thick in a very small depression. Round to ovate, resembling in shape Fondante d'Automne; skin rough, bright brown to yellow; very juicy and of very fine flavour. A magnificent late Pear. (Fig. 126.)

To Celery 'Solid White' (votes, 9 for, 6 against), from Messrs. Sutton, Reading. Very solid, crisp, and particularly sweet. An excellent variety.

Cultural Commendation.

To Mr. Bain, gr. to Sir Trevor Lawrence, Bart., Burford, for magnificent specimens of Celeriac 'Géant de Prague.'

Other Exhibits.

Her Majesty the Queen, Windsor (gr. Mr. Owen Thomas), sent Cucumber 'Frogmore All the Year Round.' The Committee desired to see it in February.

Sir Trevor Lawrence, Bart., Burford (gr. Mr. Bain), sent 'Celeriave à feuilles panachées' and some very fine specimens of 'Couve Tronchuda.'

Messrs. Kent & Brydon, Darlington, sent 'Brydon's Prize White' Celery.

Mr. J. Cross, Bury St. Edmunds, sent 'Victoria Pink' Celery.

C. Lee Campbell, Esq., Glewston Court, sent Apple 'Stamford Pippin.' It was not considered quite good enough for a dessert Apple, and hardly large enough for a cooking variety.

Mr. A. Outram, Fulham, sent 'Jubilee Red Plume' Celery.

Edward Williamson, Esq., Congleton, sent fruits of a seedling Apple, 'No. 4.' They were juicy and of good flavour, but small, and the texture of the flesh tough. Mr. Williamson in sending them said: "It is only the second year's fruiting: they will double in size in two years more, and some further increase will take place in the fifth year, after which I never find any further change. Flavour as well as size improve alike for five years." The Committee would be glad to see them in their fifth year.

FLORAL COMMITTEE.

AT CHISWICK, OCTOBER 4, 1897.

W. MARSHALL, Esq., in the Chair, and seven members present.

Awards Recommended:—

Highly Commended (× × ×).

To the following Chrysanthemums:—Edie Wright, La Vierge, Orange Child, Alice Butcher, Madame Edouard Lefort, Lady Fitzwygram, Ivy Stark, Bronze Prince, Fiberta, Martinmas, Harvest Home, Blanche Colomb, and Mdle. Guindudeau.

Also to Zonal Pelargoniums as winter flowering varieties:—Adolphe Brisson, Jules Lemaître, and W. D'Ombrain.

For report on Chrysanthemums, see p. 287.

FLORAL COMMITTEE, OCTOBER 12, 1897.

GEORGE PAUL, Esq., in the Chair, and twenty members present.

Awards Recommended:—

Silver Gilt Banksian Medal.

To Right Hon. Lord Aldenham, Aldenham House, Elstree (gr. Mr. E. Beckett), for a very large collection of Asters (Michaelmas Daisies).

To Messrs. James Veitch, Chelsea, for a group of Asters (Michaelmas Daisies) in pots, showing their natural habits and value for decorative purposes.

To Messrs. Paul & Son, Cheshunt, for a group of hardy flowers, Cotonasters, Pernettyas, and Roses.

Silver Flora Medal.

To Earl Percy, Syon House, Brentford (gr. Mr. G. Wythes), for a collection of Chrysanthemums.

To Mr. H. B. May, Upper Edmonton, for a well-flowered group of Begonia 'Gloire de Lorraine.'

Silver Banksian Medal.

To Messrs. B. S. Williams, Holloway, for a group of Crotons.

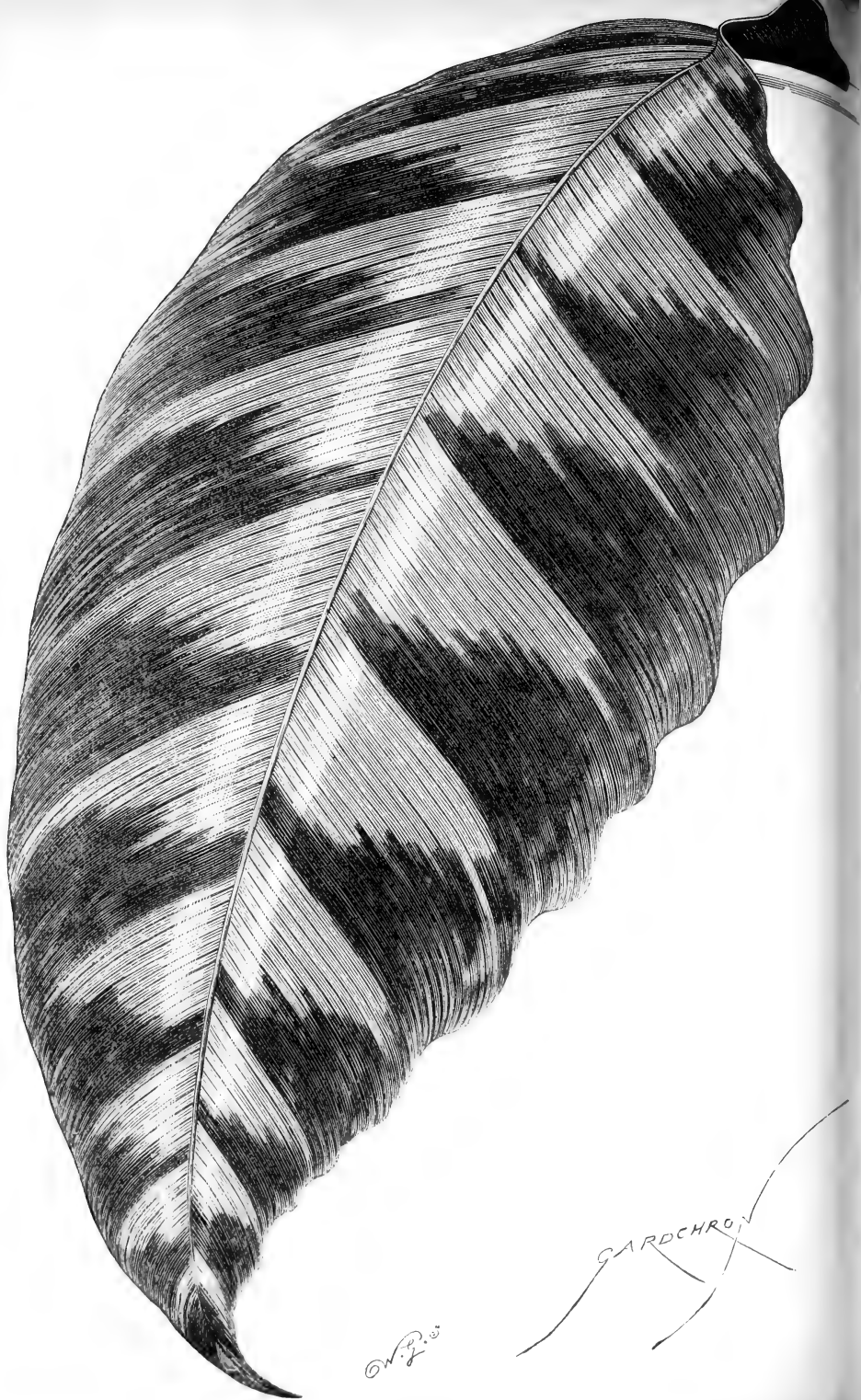


FIG. 127.—CALATHEA SPECIES (MARANTA PICTA.) (*Gardeners' Chronicle*).

To Mr. H. Deverill, Cornhill, Banbury, for a group of hardy flowers.

To Mr. G. Prince, Oxford, for a group of Roses arranged in stands, baskets, and vases.

Award of Merit.

To strain of *Begonia grandiflora erecta cristata* (Tuberous), (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain). The large beautifully crested flowers are of various shades of salmon, red, rose, pink, and orange.

To Japanese *Chrysanthemum* 'Mrs. Wingfield' (as a decorative variety) (votes, 9 for, 4 against), from Mrs. Wingfield, Ampthill House, Ampthill (gr. Mr. W. J. Empson). Plant of dwarf habit; very free flowering; flowers large, soft pink.

To *Veronica Silver Star* (votes, 9 for), from Messrs. Jas. Veitch, Chelsea. A very dwarf, compact, free-growing variety with thick, ovate, pale green leaves, broadly margined with creamy-yellow.

To *Nandina domestica* (votes, 11 for), from Messrs. Jas. Veitch. An old but very rare plant, native of China and Japan. Its light green compound leaves assume a bright reddish crimson colour in autumn.

To Japanese *Chrysanthemum* 'Madame G. Bruant' (votes, 12 for, 2 against), from Messrs. J. R. Pearson, Chilwell, Notts. Flowers very large, the petals long, white shading to yellow, and pinkish purple towards the tips.

To *Maranta picta* (votes, 8 for, 4 against), from Mr. W. Bull, Chelsea. A dwarf ornamental plant from Brazil. The leaves are 10 inches long by 3 inches broad, dark green, with olive green markings. (Fig. 127.)

Other Exhibits.

The Marquis of Huntly, Orton Longueville, Peterborough (gr. Mr. A. Harding), sent some very fine cones of the Santa Lucia Silver Fir (*Abies bracteata*).

Mrs. Parr, The Cedars, Upper Tooting (gr. Mr. J. Stott), sent three varieties of *Gloxinias*.

From J. T. Bennett-Poë, Esq., Holmwood, Cheshunt (gr. Mr. Downes), came a very handsome plant of *Sarracenia Eblana*, the result of a cross between *S. flava* and *S. purpurea*, raised at the Glasnevin Botanic Garden.

The Rev. W. Shirley, Southwick, Hants, submitted flowers of a very fine unnamed seedling Nerine. The Committee asked to see a plant in flower.

H. J. Harris, Esq., Bowden Hill House, Chippenham (gr. Mr. W. J. Penton), sent sixteen bunches of Violet 'The Czar.'

From Mr. W. Wells, Earlswood, Redhill, came four varieties of Decorative Chrysanthemums.

Mr. R. Owen, Maidenhead, sent a small group of Chrysanthemums and Cannas.

Mr. A. J. Stanley, Crosby, Liverpool, sent a bunch of Decorative Dahlia 'J. R. Callender.'

Mr. R. Botting, Henfield, submitted examples of a new Japanese Chrysanthemum, named 'Henfield.'

Mr. W. Potten, Cranbrook, Kent, staged a group of Michaelmas Daisies and Single Begonias.

Messrs. J. Peed, West Norwood, sent a group of Begonia 'Gloire de Lorraine.'

From Messrs. Hawkins & Bennett, Twickenham, came a number of well-flowered plants of Zonal Pelargonium 'Duke of Fife.'

Messrs. W. Cuthbush, Highgate, sent a group of berry-bearing plants.

Mr. W. J. Godfrey, Exmouth, submitted eight varieties of Chrysanthemums.

Messrs. James Veitch, of Chelsea, showed under the name of *Vitis Coignetiae* a small group of a very beautiful decorative vine. The foliage was of a brilliant deep crimson. It is perfectly hardy, and makes a glorious mass of colour in autumn (Fig. 128). It is not, however, identical with the *Vitis Coignetiae* of Mr. Anthony Waterer, nor is it the same as that introduced from Japan by Madame Coignet. The leaves of this latter are much more leathery, and are thickly covered with fawn-coloured down on the under side.

FLORAL COMMITTEE AT CHISWICK, OCTOBER 22, 1897.

W. MARSHALL, Esq., in the Chair, and eight members present.

Awards Recommended :—

Award of Merit.

To early flowering Chrysanthemum, Madame F. de Cariel (votes, unanimous), from Messrs. Dobbie and Messrs. Barr.

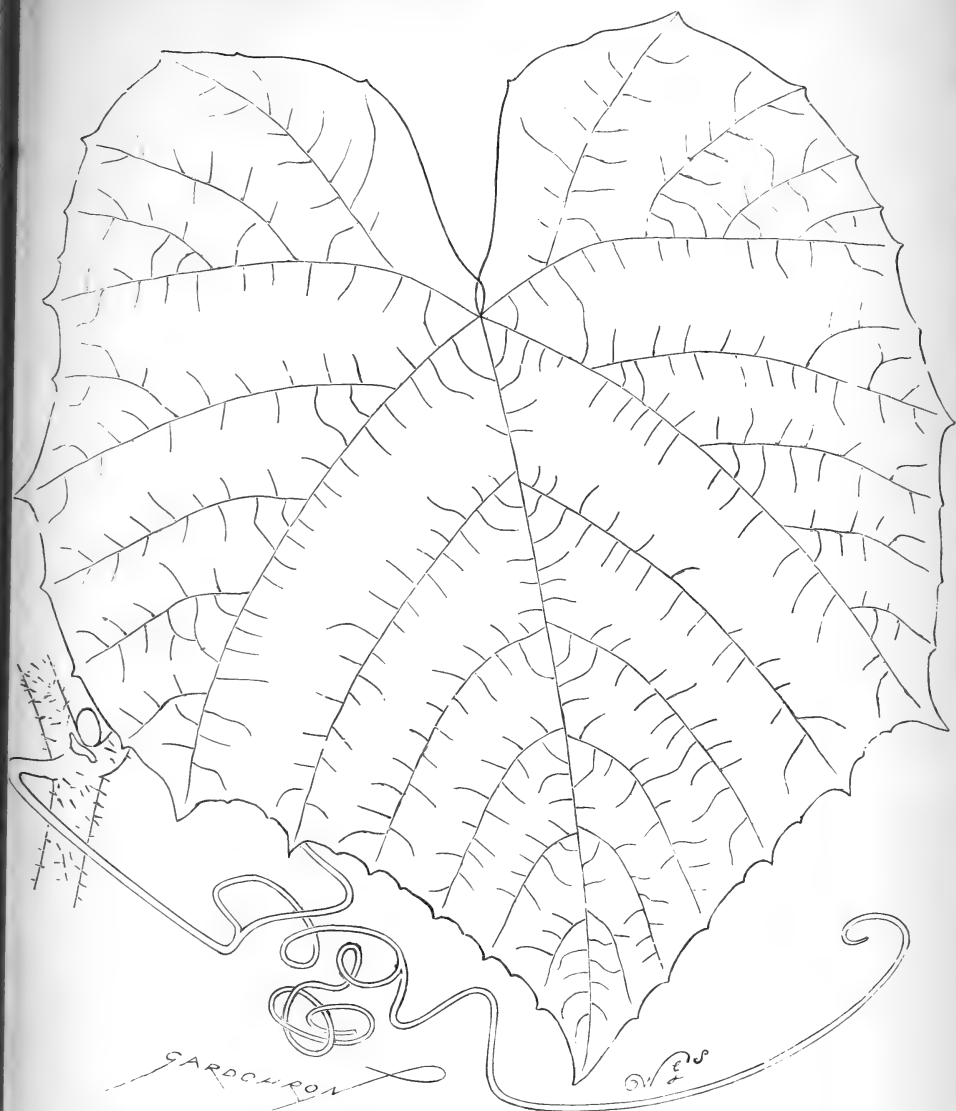


FIG. 128.—VITIS COIGNETIÆ. (*Gardeners' Chronicle*.)

Highly Commended (× × ×).

To early flowering Chrysanthemums: Mdlle. Sabatier,
Madame Gajac, Ryecroft Glory.

Also to the following Zonal Pelargoniums: Miss Joliffe, Zenobia, Lecomte de Lisle, Lilacina, Le Rhone, Niagara and Lilian.

For report on Chrysanthemums, see p. 287.

FLORAL COMMITTEE, OCTOBER 26, 1897.

W. MARSHALL, Esq., in the Chair, and twenty-four members present.

Awards Recommended:—

Silver Gilt Flora Medal.

To Mr. W. J. Godfrey, Exmouth, for a large collection of Chrysanthemums.

Silver Gilt Banksian Medal.

To Messrs. W. Paul, Waltham Cross, for Roses.

To Mr. W. Wells, Earlswood, Redhill, for Chrysanthemums.

Silver Flora Medal.

To H. J. Elwes, Esq., Colesborne, Andoversford, for a group of well-flowered Nerines.

To Mr. H. B. May, Edmonton, for Adiantums and Begonias.

To Messrs. J. Laing, Forest Hill, for a group of foliage and flowering plants.

Silver Banksian Medal.

To Earl Percy, Syon House, Brentford (gr. Mr. G. Wythes), for Chrysanthemums.

To Miss Emett, 6 St. Charles's Square, North Kensington, for models of flowers.

To Messrs. James Veitch, Chelsea, for a large group of Chrysanthemums in pots.

To Messrs. H. Cannell, Swanley, for Chrysanthemums.

To Messrs. W. Cutbush, Highgate, for a group of foliage and flowering plants.

To Mr. T. S. Ware, Tottenham, for Chrysanthemums, Carnations, and Pyracanthas.

First Class Certificate.

To Marattia Burkei (votes, unanimous), from Messrs. Jas.

Veitch, Chelsea. A very graceful Fern of vigorous and sturdy habit, with broad glossy green finely divided fronds.

Award of Merit.

To *Gesnera amabilis* (votes, unanimous), from the Duke of Sutherland, Trentham (gr. Mr. P. Blair). The cream-white bell-shaped flowers are borne with great freedom on erect pyramidal spikes.

To Nerine 'Lady Dorington' (votes, unanimous), from H. J. Elwes, Colesborne, Andoversford, Gloucester. Flowers large, pink, striped with rosy purple down the centre of each petal.

To Nerine 'Lady Mary Shelley' (votes, unanimous), from H. J. Elwes, Esq. Flowers large, pale pink, shaded with salmon. Vigorous grower.

To Nerine 'Lady Lawrence' (votes, unanimous), from H. J. Elwes, Esq. Flowers of moderate size, the long narrow wavy petals are of a pretty shade of orange suffused with salmon.

To Nerine 'Lady Lucy Hicks Beach' (votes, unanimous), from H. J. Elwes, Esq. The rosy crimson flowers are borne in large trusses. A grand variety.

To Nerine 'Lady Bromley' (votes, unanimous), from H. J. Elwes, Esq. The large flowers are produced with great freedom. Colour scarlet, each petal having a distinct slate-coloured band down the centre.

To Nerine 'Lady Llewellyn' (votes, unanimous), from H. J. Elwes, Esq. Flowers large, petals broad, colour rosy magenta.

To Nerine 'Countess Bathurst' (votes, unanimous), from H. J. Elwes, Esq. Flowers large, blush white, pink centre, lower portion of each petal striped with rose-pink.

To Japanese Chrysanthemum 'Madame Philippe Rivoire' (votes, 16 for, 2 against), from Mr. W. J. Godfrey, Exmouth. The pure white flowers are large, massive, and of excellent form.

To Japanese Chrysanthemum 'Ella Curtis' (votes, 17 for), from Mr. J. Godfrey. A very fine variety with large rich golden yellow flowers.

To Japanese Chrysanthemum 'Lady Ridgeway' (votes, unanimous), from Mr. W. J. Godfrey and Messrs. H. Cannell, Swanley. A magnificent variety. Flowers large, salmon buff, yellow reverse.

To Japanese Chrysanthemum 'Lady Byron' (votes, 13 for),

from Mr. W. J. Godfrey and Mr. W. Wells, Redhill. A very fine variety with large flowers, white shaded with green in the centre.

To Japanese Chrysanthemum 'Modesto' (votes, unanimous), from Mr. W. J. Godfrey. Flowers large, deep yellow.

To Incurved Japanese Chrysanthemum 'Sunstone' (votes, unanimous), from Mr. W. J. Godfrey. A very handsome variety with large canary yellow flowers.

To Japanese Chrysanthemum 'Simplicity' (votes, unanimous), from Mr. W. J. Godfrey. A magnificent variety with long narrow pure white drooping florets.

To Incurved Japanese Chrysanthemum 'Robert Powell' (votes 6 for, 4 against), from Messrs. H. Cannell and Mr. W. Wells. Flowers of medium size, colour rich bronzy yellow.

To Incurved Japanese Chrysanthemum 'N.C.S. Jubilee' (votes, 12 for, 7 against), from Messrs. H. Cannell and Mr. W. Wells. A handsome variety with large soft pink flowers.

To Japanese Chrysanthemum 'Lady Hanham' (votes, 12 for, 1 against), from Messrs. H. Cannell and Messrs. James Veitch. Flowers large, salmon pink shaded with cerise.

To Japanese Chrysanthemum 'G. J. Warren' (votes, 16 for, 2 against), from Mr. W. Wells. A very fine variety with clear yellow flowers.

Other Exhibits.

Lord Wantage, Lockinge Park, Wantage (gr. Mr. Fyfe), sent a group of seedling Sunflowers.

W. H. Evans, Esq., Forde Abbey, Chard (gr. Mr. J. Crook), sent a small group of cut flowers.

From J. C. Garnier, Esq., Rookesbury Park, Fareham (gr. Mr. N. Molyneux), came a very fine Chrysanthemum named 'Mrs. N. Molyneux.'

C. F. Thompson, Esq., Penhill Close, Cardiff (gr. Mr. T. Mann), sent flowers of Chrysanthemum 'Hazelden Thompson.'

From Messrs. J. R. Pearson, Chilwell, Notts, came very fine blooms of Chrysanthemum 'Mrs. G. W. Palmer.'

Mr. R. Owen, Maidenhead, staged six varieties of Chrysanthemums.

Messrs. Crane & Clarke, March, Cambridgeshire, sent Tree Carnation 'Madame Diaz Albertina.'

FLORAL COMMITTEE, NOVEMBER 9, 1897.

C. E. SHEA, Esq., in the Chair, and eleven members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To Mr. R. Gülzow, Bexley Heath, Kent, for 75 varieties of *Dracænas*.

Silver Banksian Medal.

To Earl Percy, Syon House, Brentford (gr. Mr. G. Wythes), for *Chrysanthemums*.

To Mr. John Russell, Richmond, for a most interesting collection of *Ivies* grown in tree-form in pots.

Award of Merit.

To *Sonerila* 'Lady Burton' (votes, 5 for), from Sir Trevor Lawrence, Bart., Dorking (gr. Mr. W. Bain). A very ornamental foliage plant, growing to a height of about 8 inches, with silvery-grey foliage and conspicuous green venations.

To strain of Wallflower 'Parisian Early' (votes, unanimous), from Messrs. James Veitch, Chelsea. Plants of dwarf sturdy habit; very free flowering; flowers very fragrant, large, yellow, tinged with bronze.

To Japanese Reflexed *Chrysanthemum* 'Admiral Ito' (votes, 7 for, 2 against), from Mr. W. J. Godfrey, Exmouth. Large flowers of a deep golden yellow colour.

To *Dracæna albo-lineata* (votes, 7 for), from Mr. R. Gülzow, Bexley Heath. Leaves 20 inches long, narrow, deep green, margined with creamy-white.

To *Dracæna Indivisa* *Burtoni* (votes, 7 for), from Mr. R. Gülzow. A graceful variety with long narrow arching bronze green leaves, striped with reddish purple down the centre.

To *Bouvardia Humboldti grandiflora* (votes, 10 for), from Messrs. Crane & Clarke, March, Cambridge. Plant of vigorous habit, with glossy green leaves, and large pure white sweetly scented flowers.

Other Exhibits.

A. Kingsmill, Esq., Harrow Weald, sent some well-berried

sprays of *Vitis heterophylla humulifolia*, a Vine with turquoise-blue Grapes.

C. F. Thompson, Esq., Penhill Close, Cardiff (gr. Mr. T. Mann), exhibited Seedling Pentstemons.

From F. W. Moore, Esq., Glasnevin, came examples of *Cyrtanthera chrysostephana*.

Messrs. Hugh Low, Bush Hill, Enfield, staged a group of Mathew's 'Winter Red' Carnation.

Messrs. W. Balchin, Hassocks, Sussex, sent *Diplacus rubra* and D. 'Jubilee.' The Committee asked to see these again in the spring.

Chrysanthemums were exhibited by—

- (1) Sir Trevor Lawrence, Dorking (gr. Mr. W. Bain).
- (2) W. W. Mann, Esq., Ravenswood, Bexley.
- (3) Mr. C. Caddell, Cainfield, Herts.
- (4) Mr. R. Owen, Maidenhead.
- (5) The Devon Chrysanthemum Nursery, Teignmouth.
- (6) Mr. Wiles, Down, Kent.
- (7) Mr. G. Lane, Highfield, Englefield Green.
- (8) Mr. W. J. Godfrey, Exmouth.
- (9) Mr. M. Silsbury, Shanklin, I.W.

FLORAL COMMITTEE, NOVEMBER 23, 1897.

W. MARSHALL, Esq., in the Chair, and fifteen members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Mr. H. J. Jones, Lewisham, for Chrysanthemums.

Silver-gilt Banksian Medal.

To J. W. Temple, Esq., Leyswood, Groombridge (gr. Mr. F. Cubberley), for an exceptionally well-flowered group of *Begonia* 'Gloire de Lorraine.'

To Mr. W. Wells, Earlswood, for Chrysanthemums.

Silver Flora Medal.

To Mr. L. H. Calcutt, Fairholt Road, Stoke Newington, for table decorations.

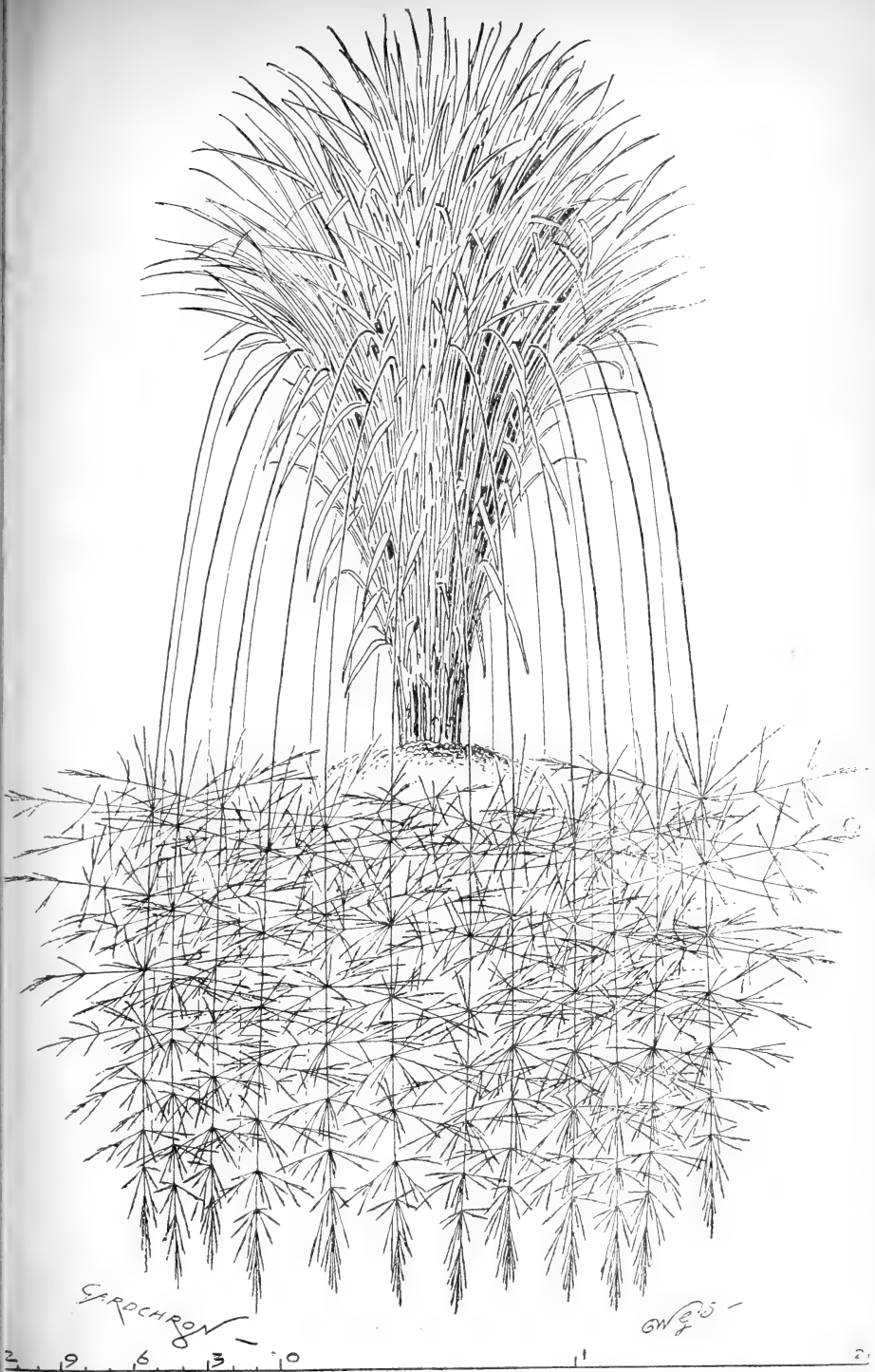


FIG. 129.—*APERARUNDINACEA*. See p. clxv. (*Gardeners' Chronicle*.)

Silver Banksian Medal.

To Dowager Lady Freake, Fulwell Park, Twickenham (gr. Mr. A. H. Rickwood), for Chrysanthemums.

To Messrs. W. Cutbush, Highgate, for Pernettyas.

To Messrs. T. Cripps, Tunbridge Wells, for Poinsettias.

Bronze Banksian Medal.

To Mr. R. Owen, Maidenhead, for Chrysanthemums.

Award of Merit.

To Japanese Chrysanthemum 'Mary Molyneux' (votes, 9 for), from J. C. Garnier, Esq., Rookesbury Park, Fareham (gr. Mr. N. Molyneux). Flowers large, of good form and substance; colour soft pink with a silvery reverse.

To Japanese Chrysanthemum 'Mrs. H. Folkes' (votes, 12 for), from C. E. Strachan, Esq., Gaddesden Place, Hemel Hempstead (gr. Mr. H. Folkes). A magnificent variety with long narrow curled pure white petals.

To Begonia 'Julius' (votes, 12 for), from Messrs. James Veitch, Chelsea. A very handsome free flowering variety with deep green leaves and large trusses of double salmon-rose flowers.

To Japanese Chrysanthemum 'Julia Scaramanga' (votes, unanimous), from Mr. W. Wells, Earlswood. Flowers large deep terra-cotta with a paler reverse.

To Japanese Chrysanthemum 'Georgina Pitcher' (votes, unanimous), from Mr. W. Wells. A handsome variety with large rich yellow flowers.

To Japanese Chrysanthemum 'F. A. Bevan' (votes, unanimous), from Mr. Wells. Soft pink flowers of medium size.

Other Exhibits.

A. Kingsmill, Esq., Harrow Weald, submitted sprays of *Skimmia Foremani* and *Pernettyas*.

Mr. T. H. Smith, The Titt, Cobham, sent two Carnations.

Messrs. Hugh Low, Clapton, sent Carnations and Begonias.

Messrs. J. Veitch, Chelsea, exhibited Begonia 'Mrs. Heal.'

Mr. A. Tullet, Swanley, sent Zonal Pelargonium 'A. Tullet.' Chrysanthemums were exhibited by—

(1) Mons. Annatole Cardonnier, Bayonne, France.

(2) Mr. G. Beer, Worthing.

(3) Mr. H. Becker, Jersey.

(4) Mr. W. J. Godfrey, Exmouth.

FLORAL COMMITTEE, DECEMBER 14, 1897.

W. MARSHALL, Esq., in the Chair, and twenty-four members present.

Awards Recommended :—*Silver Flora Medal.*

To J. W. Temple, Esq., Leyswood, Groombridge (gr. Mr. F. Cubberley), for Chrysanthemums in pots.

To Mr. H. J. Jones, Lewisham, for Chrysanthemums.

Silver Banksian Medal.

To A. Pears, Esq., Spring Grove, Isleworth (gr. Mr. W. Farr), for Euphorbias (Poinsettias) and Begonias.

To Messrs. H. Cannell, Swanley, for Zonal Pelargoniums.

To Messrs. W. Cutbush, Highgate, for double Primulas.

Bronze Banksian Medal.

To Messrs. Hugh Low, Enfield, for Carnations and Cyclamen.

Award of Merit.

To Begonia 'Winter Cheer' (B. Socotrana ♂ × B. Tuberous variety) (votes, unanimous), from Messrs. James Veitch, Chelsea. A vigorous growing variety of erect habit, with deep green leaves and large rosy carmine single flowers borne in loose trusses.

Other Exhibits.

W. C. Walker, Esq., Percy Lodge, Winchmore Hill (gr. Mr. Cragg), sent flowering sprays of Cissus discolor.

W. H. Evans, Esq., Forde Abbey, Chard (gr. Mr. J. Crook), sent a small bunch of cut flowers.

A. R. Knight, Esq., Hardinge Road, Ashford, Kent, exhibited a patent flower-pot.

Mr. J. Bryson, Helensborough, sent eight varieties of Chrysanthemums.

From Messrs. E. Hillier, Winchester, came a white sweet-scented Carnation named 'Miss Lilian Hillier.'

Mr. J. R. Tranter, Henley-on-Thames, sent Japanese Chrysanthemum 'Mrs. J. R. Tranter.'

ORCHID COMMITTEE.

OCTOBER 12, 1897.

HARRY J. VEITCH, Esq., in the Chair, and thirteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. James Veitch, King's Road, Chelsea, for a very fine group of Orchids, in which were many showy and rare hybrids.

Silver Flora Medal.

To R. I. Measures, Esq., Cambridge Lodge, Camberwell, for an effective group of *Cattleya labiata*, including the white *C. labiata* 'R. I. Measures.'

To Messrs. Hugh Low, Clapton, for a group of Orchids.

Silver Banksian Medal.

To Messrs. B. S. Williams, Upper Holloway, for a group of Orchids.

Award of Merit.

To *Vanda cœrulea Rochfordiana* (votes, unanimous), from Mr. T. Rochford, Turnford Hall, Herts. A very distinct variety, with pure white sepals and petals, and pink-coloured labellum.

To *Vanda* × *Moorei* (*V. Kimballiana* × *V. cœrulea*, nat. hyb.) (votes, unanimous), from Mr. J. W. Moore, Eldon Place, Bradford. The plant exhibited was intermediate in character between the reputed parents. Sepals and petals white, tinged with lavender; front lobe of the lip dull purple. (Fig. 130.)

To *Odontoglossum grande Pittianum* (votes, unanimous), from H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Aldous). A clear yellow variety, in which the brown colour seen in the type is suppressed.

To *Zygopetalum Jorisianum* (votes, 6 for, 1 against), from Walter Cobb, Esq., Dulcote, Tunbridge Wells (gr. Mr. J. Howes). A pretty species introduced by Messrs. Linden, and illustrated in 'Lindenia,' v. t. 93. (Fig. 131.)

To *Lælia pumila*, 'Low's var.' (votes, unanimous), from

Messrs. Hugh Low, Clapton. A blue-tinted variety, much resembling *L. pumila* 'Gatton Park var.'

Botanical Certificate.

To *Cryptophoranthus Dayanus*, from Sir Trevor Lawrence,



FIG. 130.—*VANDA MOOREI*. (*Gardeners' Magazine*.)

Bart., Burford, Dorking. A splendid specimen bearing many singular flowers was shown.

To *Dendrobium taurinum amboinense*, from Messrs. James Veitch. A remarkable variety, distinguished from the type by its yellow and brown flowers.

To *Nanodes Mantinii*, from F. W. Moore, Esq., Royal Botanic Gardens, Glasnevin, Dublin.

Other Exhibits.

His Grace the Duke of Westminster, Eaton Hall, Chester (gr. Mr. Barnes), sent a very fine form of *Dendrobium Phalænopsis Schröderianum*.



FIG. 131.—*ZYGOPETALUM JORISIANUM*. (*Gardeners' Magazine*.)

Messrs. F. Sander, St. Albans, showed *Cattleya labiata* and other Orchids.

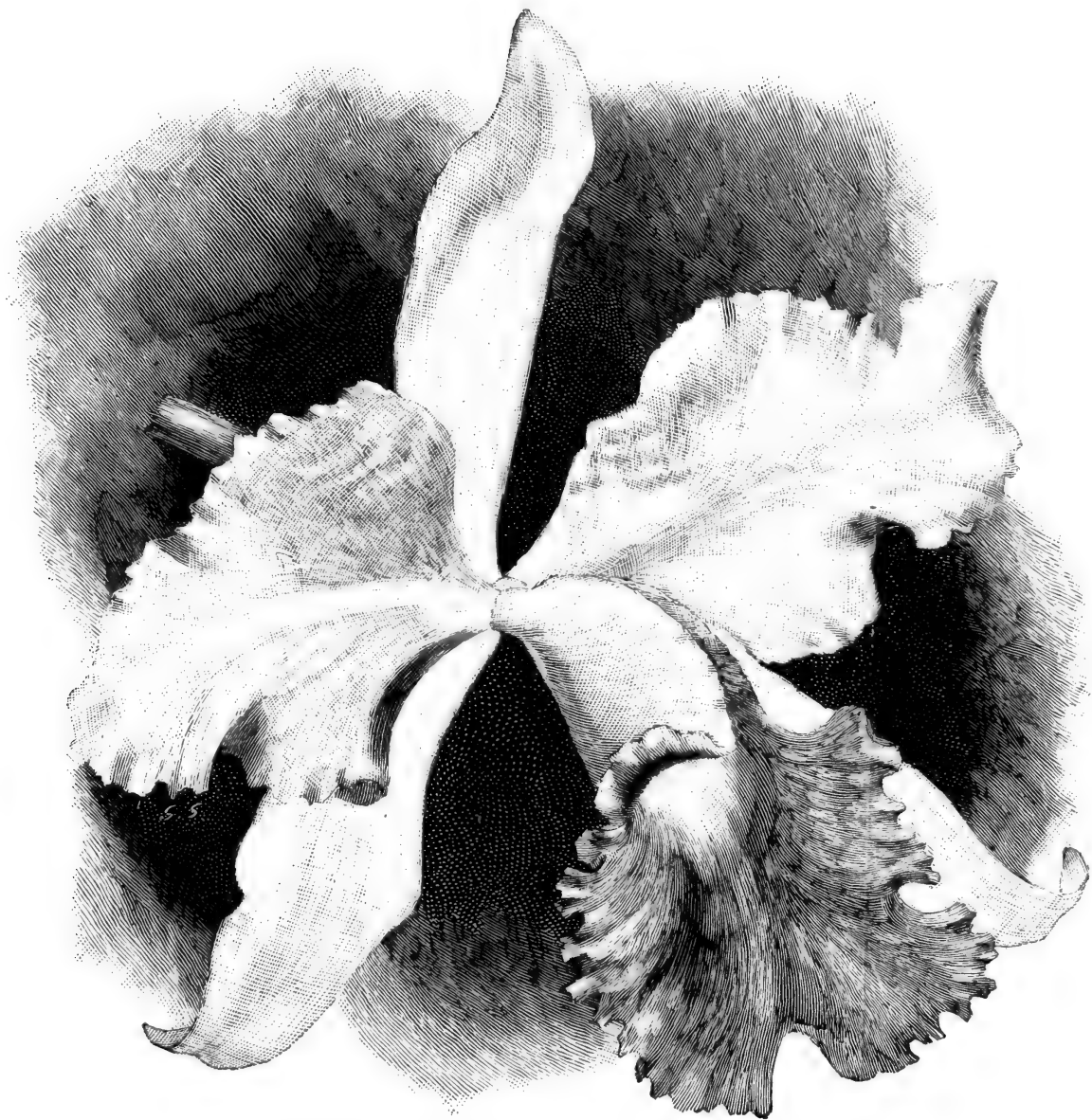
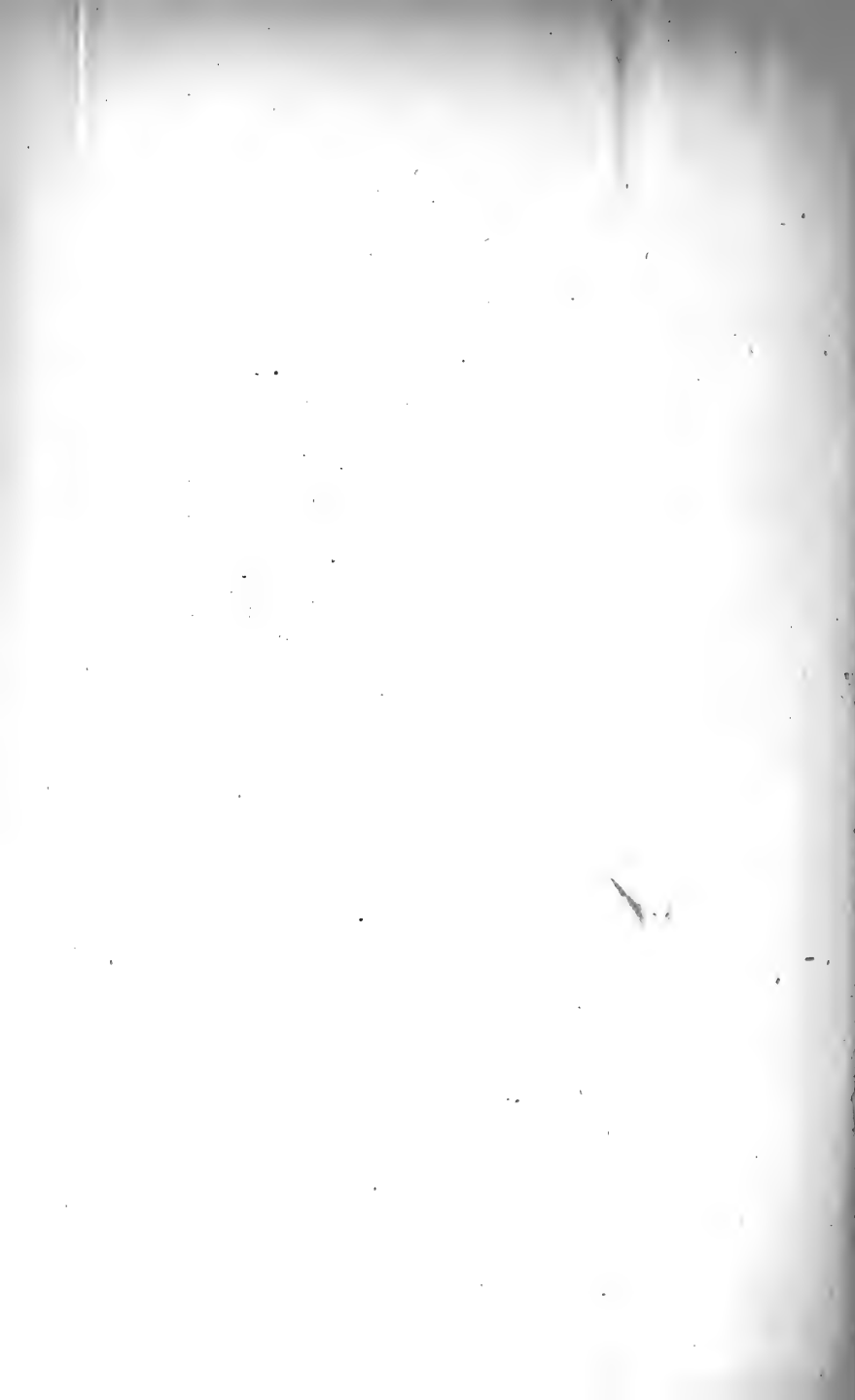


FIG. 132.—CATTLEYA × OLIVIA. (*Journal of Horticulture.*)



C. L. N. Ingram, Esq., Elstead House, Godalming (gr. Mr. T. W. Bond), showed several hybrid Cattleyas.

J. Bradshaw, Esq., Southgate (gr. Mr. Whiffen), sent *Cattleya* × *Mantinii nobilior*.

J. W. Temple, Esq., Groombridge (gr. Mr. Bristow), showed *Lælio-Cattleya* × *Templeæ* of unrecorded parentage, but resembling *Cattleya* × *Minucia*.

H. J. Harris, Esq., J.P., Chippenham, sent a good variety of *Odontoglossum grande*.

ORCHID COMMITTEE, OCTOBER 26, 1897.

HARRY J. VEITCH, Esq., in the Chair, and fifteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Jas. Veitch, Chelsea, for a remarkably fine group of [Orchids, including several hybrids of *Lælia Perrinii*, and other autumn-flowering varieties.

Silver Flora Medal.

To R. I. Measures, Esq., Cambridge Lodge, Camberwell, for a collection of twenty-five varieties of *Cattleya labiata*, some hybrid *Cypripediums*, &c.

Silver Banksian Medal.

To Mrs. Wingfield, Ampthill House, Bedfordshire (gr. Mr. W. J. Empson), for a group of Orchids.

To W. C. Walker, Esq., Percy Lodge, Winchmore Hill (gr. Mr. Geo. Cragg), for a group of Orchids.

Award of Merit.

To *Cattleya* × 'Olivia' (*Trianaei* ♀ *intermedia* ♂) (votes, unanimous), from Messrs. J. Veitch, Chelsea. Flower in size equal to a small *C. labiata*. In colour of a uniform Peach-blossom tint. (Fig. 132.)

To *Cattleya* × 'Melpomene' (*Forbesii* ♀ *Mendelii* ♂) (votes, 7 for, 0 against), from Messrs. Jas. Veitch. Sepals and petals light rose ; lip white, tinged with pink ; centre yellow.

To *Lælia purpurata* 'Mrs. R. I. Measures' (votes, 8 for, 2 against), from R. I. Measures, Esq., Cambridge Lodge, Camberwell (gr. Mr. H. J. Chapman). A variety in which the petals are closely veined with rose colour on white ground.

To *Cattleya* × *Hardyana* var. *magnifica* (votes, unanimous), from Fred. Hardy, Esq., Tyntesfield, Ashton-on-Mersey (gr. Mr. T. Stafford). Flowers large, lip broad, and of a dark purplish-crimson colour.

To *Cattleya Bowringiana*, Wild's variety (votes, unanimous), from C. K. Wild, Esq., Bramcote, Weybridge (gr. Mr. R. Pallant). A very large and handsomely coloured variety.

To *Lælia pumila*, var. *albens* (votes, unanimous), from Fred. Hardy, Esq., Tyntesfield, Ashton-on-Mersey (gr. Mr. T. Stafford). Flowers white, with some purple markings on each side of the lip.

To *Odontoglossum crispum* 'Sunlight' (votes, unanimous), from R. Brooman-White, Esq., Arddarroch, Garelohead, N.B. Flowers large, white with some red-brown blotches and small purple spots on the petals.

To *Lælia pumila magnifica* (votes, unanimous), from Messrs. W. L. Lewis, Southgate. Flowers much larger than the ordinary form and fine in colour.

To *Cypripedium* × *Haynaldo-Chamberlainii* (*Haynaldanum* ♂ *Chamberlainianum* ♀) (votes, unanimous), from Elijah Ashworth, Esq., Harefield Hall, Wilmslow, Cheshire (gr. Mr. H. Holbrook). Flowers somewhat resembling those of *C. Victoria Mariæ*. Upper sepal white, green at the base, with narrow purple lines. Lip rose-purple margined greenish-yellow. Petals green with chocolate-purple markings.

Cultural Commendation.

To Mr. W. H. White (gr. to Sir Trevor Lawrence, Bart., Burford, Dorking), for *Lælia Perrinii alba*, Burford variety. Flowers white; front of the lip pink, as in *L. Perrinii nivea*.

To Mr. R. Pallant (gr. to C. K. Wild, Esq., Bramcote, Weybridge), for *Cattleya Bowringiana*, Wild's variety.

Botanical Certificate.

To *Lælia longipes* (*L. Lucasiana*), from Messrs. W. L. Lewis, Southgate.

Other Exhibits.

Messrs. Hugh Low, Clapton, showed varieties of *Cattleya labiata* and a number of plants of *Vanda cœrulea*.

Messrs. B. S. Williams, Holloway, staged a group of Orchids.

Messrs. F. Sander, St. Albans, showed varieties of *Cattleya labiata* and other Orchids.

Thos. Statter, Esq., Stand Hall, Whitefield, Manchester (gr. Mr. R. Johnson), again showed the plant of *Cattleya Dowiana aurea Johnsonii*, for which he received a Certificate in 1885.

Mrs. Briggs-Bury, Bank House, Accrington, showed *Cattleya* × *Adonis*, said to be *C. Warscewiczii* × *C. Mossiæ*, but which the Committee thought merely an imported light-coloured *C. Warscewiczii*.

J. Bradshaw, Esq., The Grange, Southgate (gr. Mr. Whiffen), sent varieties of *Cattleya labiata*.

Captain Thos. A. Julian, Woodside, Plymouth, sent two fine light varieties of *Dendrobium Phalænopsis*.

C. L. N. Ingram, Esq., Elstead House, Godalming (gr. Mr. T. W. Bond), showed hybrid *Lælio-Cattleyas*.

Reginald Young, Esq., Linnet Lane, Sefton Park, Liverpool (gr. Mr. Poyntz), showed *Cattleya Dowiana aurea*, Young's var., and *Cypripedium* × *Clio*.

E. Hockliffe, Esq., The Hall, Uppingham, Rutland (gr. Mr. Cant), showed *Cattleya* × *Hardyana*, Hockliffe's variety.

Frau Ida Brandt, Riesbach, Zurich (gr. Mr. Schlecht), sent varieties of *Miltonia spectabilis*.

G. W. Law-Schofield, Esq., New-Hall-Hey, Rawtenstall, Manchester, showed *Lælia purpurata* 'Annie Louise.'

Frank Lloyd, Esq., Coombe House, Croydon, showed *Cattleya labiata* with abnormal flowers.

T. W. Swinburne, Esq., Corndean Hall, Winchcombe, sent an abnormal flower of *Odontoglossum grande*.

ORCHID COMMITTEE, NOVEMBER 9, 1897.

HARRY J. VEITCH, Esq., in the Chair, and twelve members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Jas. Veitch, Chelsea, for an interesting group of hybrid Orchids.



FIG. 133.—CATTLEYA FABIA. (*Journal of Horticulture*.)

Silver Banksian Medal.

To the Right Hon. Joseph Chamberlain, Birmingham (gr. Mr. Smith), for well-grown hybrid Cattleyas and Lælio-Cattleyas.

To G. Shorland Ball, Esq., Wilmslow, Cheshire (gr. Mr. Alex. Hay), for a group of rare Orchids.

To Messrs. W. L. Lewis, Southgate, for a group of 50 *Lælia pumila*.

To Messrs. F. Sander, St. Albans, for a group of Orchids.

First Class Certificate.

To *Cattleya* × 'Fabia' (labiata ♀ *Dowiana aurea* ♂), from the Right Hon. Joseph Chamberlain (gr. Mr. Smith). A fine hybrid, originally raised by Messrs. Jas. Veitch & Sons, and exhibited by them in 1894. Flowers large, sepals and petals light rose, with a slight tinge of yellow; lip broad, dark purple, with some obscure orange-coloured markings at the base. (Fig. 133.)

To *Calanthe* × *Veitchii alba* (votes, unanimous), from Messrs. Hugh Low, Clapton. Flowers pure white, with pale yellow centre.

Award of Merit.

To *Cattleya labiata Lewisii* (votes, unanimous), from Messrs. W. L. Lewis, Southgate. Sepals and petals white, front of lip violet purple with white margin.

To *Cypripedium* × *Leeanum magnificum* (votes, 9 for), from G. Shorland Ball, Esq. (gr. Mr. A. Hay). Flowers resembling the variety *giganteum*, but darker in colour.

Cultural Commendation.

To Mr. Alex. Hay (gr. to G. Shorland Ball, Esq., Wilmslow), for *Cypripedium insigne Sanderæ* with six flowers.

Other Exhibits.

The Right Hon. Joseph Chamberlain (gr. Mr. Smith) showed *Cattleya* × *Massiliensis*, a Continental hybrid stated to be between *C. Trianaei* and *C. Dowiana aurea*, but in which the Committee failed to find traces of the latter.

W. Vanner, Esq., Chislehurst (gr. Mr. Robbins), showed *Cypripedium* × *Vanneræ* (*superbiens* × *selligerum majus*), *C.* × *Eyeranianum superbum*, and *Odontoglossum crispum Dormanianum*.

Henry Tate, Esq., Allerton Beeches, Liverpool, sent *Cypripedium* × *Allertonensis* (*villosum* × *bellatulum*?); and *C. insigne bisepala*, with lower sepals larger than the upper.

C. L. N. Ingram, Esq., Godalming (gr. Mr. T. W. Bond), sent *Cattleya* × *Comfrey* (*Lawrenceana* × *Warsciwiczii*).

J. T. Bennett Poë, Esq., Holmewood, Cheshunt (gr. Mr. Downes), showed *Vanda Sanderiana* and *Cypripedium* × *Phoenix*, of unrecorded parentage.

Mrs. S. Wood, Moorfield, Glossop, sent *Cypripedium* × *Alcides* var.

S. G. Lutwyche, Esq., Beckenham, sent *Cypripedium* × *pavoninum* and *C.* × *Indra*.

ORCHID COMMITTEE, NOVEMBER 23, 1897.

HARRY J. VEITCH, Esq., in the Chair, and eleven members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Jas. Veitch, Chelsea, for a group of hybrid Orchids, principally *Cypripediums*.

To Messrs. Hugh Low, Clapton, for a group of Orchids.

Silver Banksian Medal.

To the Right Hon. Joseph Chamberlain, Birmingham (gr. Mr. Smith), for a group of six specimen *Cattleyas* and *Lælio-Cattleyas*, amongst them being the beautiful *Lælio-Cattleya* 'Clive' (*C. Dowiana* ♀ × *L. pumila præstans* ♂). Sepals and petals bright rose; lip rich maroon-purple with a golden yellow base marked with fine red lines. (Fig. 134.)

To Messrs. F. Sander, St. Albans, for a group of Orchids.

Award of Merit.

To *Cattleya labiata* 'White Queen' (votes, unanimous), from W. P. Burkinshaw, Esq., Hessle, near Hull (gr. Mr. J. Barker). Flowers white, with a lemon-yellow tinge at the base of the lip, and slight trace of pink at its apex.

To *Cypripedium* × *Beeckmani* (stated to be *villosum* Boxalli *superbum* × *bellatulum*) (votes, unanimous). The majority of the Committee doubted the use of *C. bellatulum* as one of the agents in its production. A massive flower with emerald green

dorsal sepal, spotted with black, and edged with white. Petals broad, chestnut-red, margined yellow; lip chestnut-red with yellow margin. Flower very glossy.

To *Odontoglossum Dayanum* (? *præstans* var.) (votes, unani-



FIG. 134.—*LÆLIO-CATTELEYA* 'CLIVE.' (*Gardeners' Chronicle*.)

mous), from Baron Sir H. Schröder, The Dell, Egham (gr. Mr. H. Ballantine). Flowers of good size, cream-white, spotted cinnamon colour.



FIG. 135.—CATTLEYA 'EMPRESS FREDERICK.' (*Gardeners' Chronicle*.)

To Cattleya × 'Empress Frederick,' var. *Leonatæ* (*Mossiaë* × *Dowiana*) (votes, unanimous), from Messrs. Jas. Veitch, Chelsea.

The original form had white sepals and petals; this variety, which bore some resemblance to *C. × Hardyana*, rose-coloured ones. (Fig. 135.)

To *Lælia × 'Olivia'* (*crispa × xanthina*) (votes, unanimous), from Messrs. Jas. Veitch. Flowers yellow, slightly tinged with red, and with dull rose-coloured markings on the lip.

Botanical Certificate.

To *Cirrhopetalum refractum*, from R. I. Measures, Esq.,



FIG. 136.—*MAXILLARIA ELEGANTULA*. (*Gardeners' Chronicle*.)

Cambridge Lodge, Camberwell. This is sometimes called the 'Windmill Orchid,' its nodding raceme of greenish-yellow flowers having the connate sepals extended, so that they move with the slightest current of air.

To *Maxillaria elegantula*, Rolfe, from Messrs. F. Sander, St. Albans, an ally of *M. fucata*. Flowers white, tinged with yellow on the outer portions of the segments, and spotted with chocolate colour. (Fig. 136.)

Other Exhibits.

Captain Holford, Westonbirt, Tetbury (gr. Mr. A. Chapman), sent a collection of Orchids.

W. H. Lumsden, Esq., Balmedie, Aberdeen (gr. Mr. Roberts), sent flowers of varieties of *Cypripedium insigne*.

The Hon. P. Allsopp, Battenhall Mount, Worcester (gr. Mr. Fox), sent a fine plant of *Cypripedium insigne Vigorniense*, a variety in which the usual spotting is partially suppressed.

Philip Crowley, Esq., Waddon House, Croydon (gr. Mr. Harris), sent *Cattleya labiata* and *C. l. rosea*.

W. B. Latham, Esq., Botanic Gardens, Edgbaston, Birmingham, sent *Cypripedium* × *Deedmanianum* (*Spicerianum* ♀ *Chamberlainianum* ♂), which bore a remarkable resemblance to *C.* × *Haynaldo-Chamberlainii* shown at the last meeting.

ORCHID COMMITTEE, DECEMBER 14, 1897.

HARRY J. VEITCH, Esq., in the Chair, and fifteen members present.

Awards Recommended:—*Silver-gilt Flora Medal.*

To Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. H. White), for a fine group of Orchids, in which the beautiful hybrid *Calanthes* raised at Burford were conspicuous.

Silver Flora Medal.

To Messrs. Jas. Veitch, Chelsea, for a fine group of Orchids.

Silver Banksian Medal.

To Messrs. Hugh Low, Clapton, for an effective group of Orchids.

First Class Certificate.

To *Calanthe* × *Harrisi* (votes, unanimous), from J. T. Bennett Poë, Esq., Holmewood, Cheshunt (gr. Mr. Downes). A white flower characterised by its peculiar broad lip. It had previously received an Award of Merit. (Fig. 137.)

Award of Merit.

To *Calanthe* × *sanguinaria* (votes, unanimous), from Sir



FIG. 137.—*CALANTHE HARRISII*. (*Gardeners' Chronicle*.)

Trevor Lawrence, Bart. (gr. Mr. W. H. White). Flowers dark blood-red ; very fine.

To *Calanthe* × *Burfordiense* (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Flowers bright carmine-rose.

To *Calanthe* × *Veitchii splendens* (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Flowers larger and darker in colour than the original.

To *Brasso-Catt-Lælia* × *Lindleyano-elegans* (*Brasso-Cattleya* × *Lindleyana* × *Lælio-Cattleya* × *elegans*) (votes, unanimous),



FIG. 138.—*TRICHOPIILIA BREVIS*. (*Gardeners' Magazine*.)

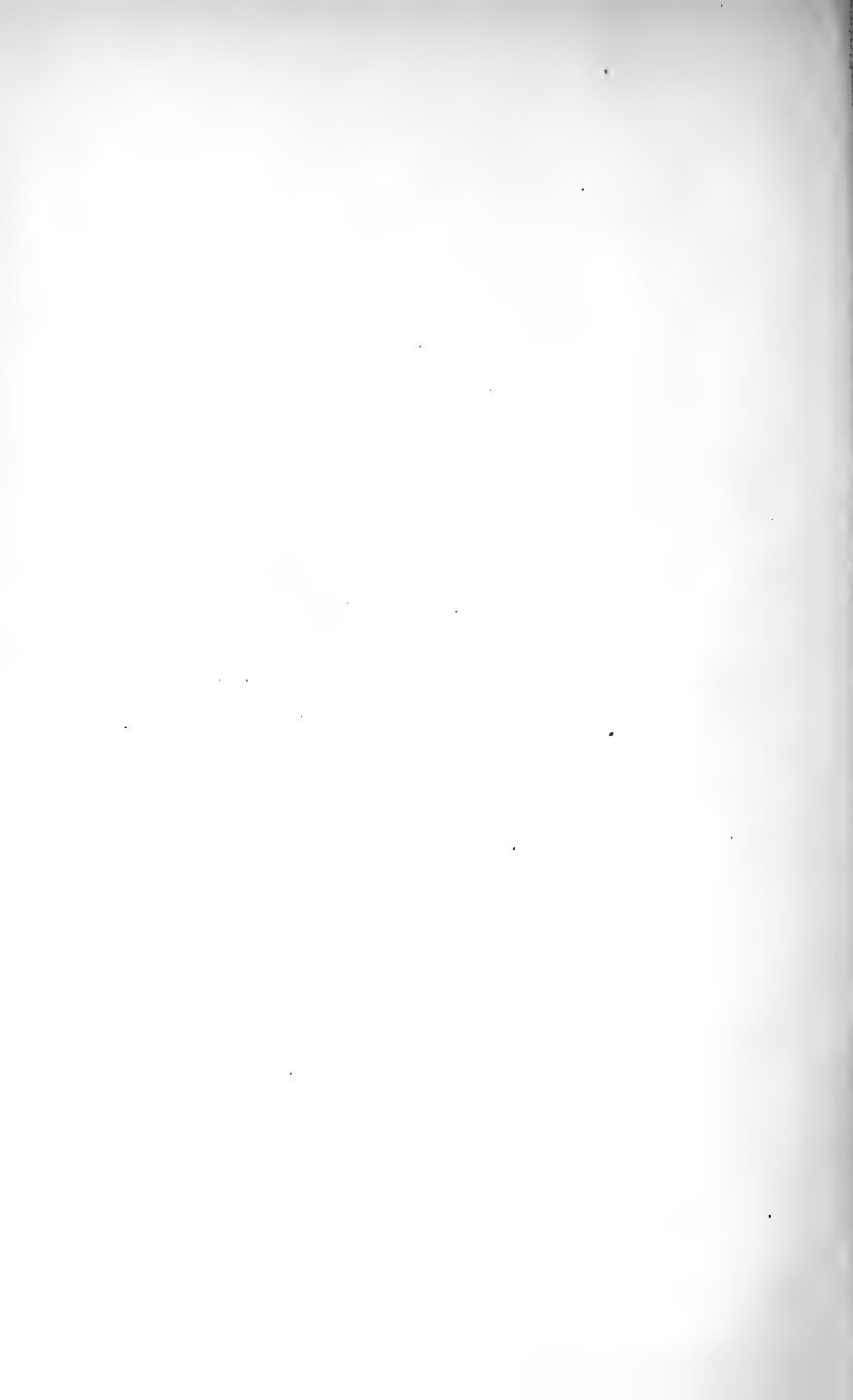
from Sir Trevor Lawrence, Bart. A singular cross, with narrow segments. Sepals and petals blush-white ; lip dark purple.

To *Lælia rubescens* (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White), and from W. C. Walker, Esq., Winchmore Hill (gr. Mr. G. Cragg). A fine variety of the plant, generally known in gardens as *L. peduncularis*. (Fig. 139.)

To *Trichopilia brevis* (votes, unanimous), from Sir Frederick



FIG. 139.—*LÆLIA RUBESCENS*. (*Gardeners' Magazine*.)



Wigan, Clare Lawn, East Sheen (gr. Mr. W. H. Young). Sepals and petals yellow barred with brown; lip white. Of the *Helcia* section. (Fig. 138.)

To *Cypripedium* × *Æson giganteum* (insigne ♀ *Druryi* ♂) (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. A massive flower of the general appearance of *C. insigne*.

To *Cypripedium* × *Minosa magnificum* (*Spicerianum* ♀ *Arthurianum* ♂) (votes, unanimous), from Messrs. Jas. Veitch. A fine hybrid with large flowers, yellow and reddish brown, the upper sepal being white at the tip, spotted with purple.

To *Lælia pumila superba* (votes, unanimous), from R. W. Rickards, Esq., The Priory, Usk. Flowers very large and finely coloured.

To *Lælia anceps* 'Mrs. De B. Crawshay' (votes, 6 for, 3 against), from De B. Crawshay, Esq. A fine flower with very darkly coloured sepals and petals. (Fig. 140.)

To *Lælia* × 'Briseis' (*harpophylla* × *purpurata*), from Mr. James Douglas, Great Bookham. Flowers two inches across, sepals and petals lanceolate; white tinged with yellow. Lip narrow, whitish, with some rose markings in front.

Botanical Certificate.

To *Oncidium saltabundum*, from F. W. Moore, Esq., Royal Botanic Gardens, Glasnevin, Dublin. Flowers on a long branched spike; small, brown and yellow.

To *Masdevallia corniculata*, from Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. H. White). Flowers inflated, yellow, with red spots.

To *Bulbophyllum Medusæ*, from Sir Trevor Lawrence, Bart. The plant had ten spikes bearing large plume-like heads of cream-coloured flowers.

Cultural Commendation.

To Mr. W. H. White gr. to Sir Trevor Lawrence, Bart., for *Bulbophyllum Medusæ*.

To Mr. W. H. White, for *Dendrobium Cymbidioides*.

Other Exhibits.

Messrs. B. S. Williams, Holloway, sent a group of Orchids in which was a pan of *Calanthe* × *Oweniana* having carmine-rose flowers.



FIG. 140 — *LELIA ANCEPS* 'MRS. DE BARRY CRAWSHAY.' (*Journal of Horticulture*.)

Baron Sir H. Schröder, The Dell, Staines (gr. Mr. Ballantine), showed the fine *Lælia anceps* Chamberlainiana.

Admiral Sir Henry Fairfax, Ravenswood, Melrose, sent a fine *Lælia anceps* of the 'Amesiana' class.

C. J. Lucas, Esq., Warnham Court, Horsham (gr. Mr. Duncan), sent *Lælia anceps* Schröderæ.

Messrs. Paul & Son, Cheshunt, showed baskets of *C. Spicerianum*, *C. insigne* varieties, and other *Cypripediums* in fine health grown in a house where the temperature often fell to 35°–40° Fahr.

Mr. T. Duck, Abbey Wood, Kent, showed *Cyperorchis Mastersii* alba.

W. Thompson, Esq., Walton Grange, Stone (gr. Mr. Stevens), showed *Cattleya* × *Miranda*.

Walter Cobb, Esq., Tunbridge Wells, showed *Cypripedium* × *J. Howes*.

Thos. McMeekin, Esq., Norwood (gr. Mr. Wright), showed two hybrid *Cypripediums*.

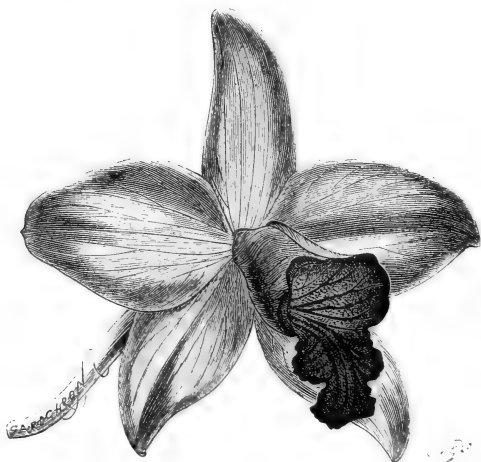


FIG. 141.—SOPHRO-CATTELEYA × LÆLIA (*LÆLIA PUMILA* DAYANA ♀ × *SOPHRONITIS GRANDIFLORA* ♂). (*Gardeners' Chronicle*.) Sepals and petals pale red-pink, base of the lip white, and the front a shade of rose. See vol. xvii. p. ccxlvii.

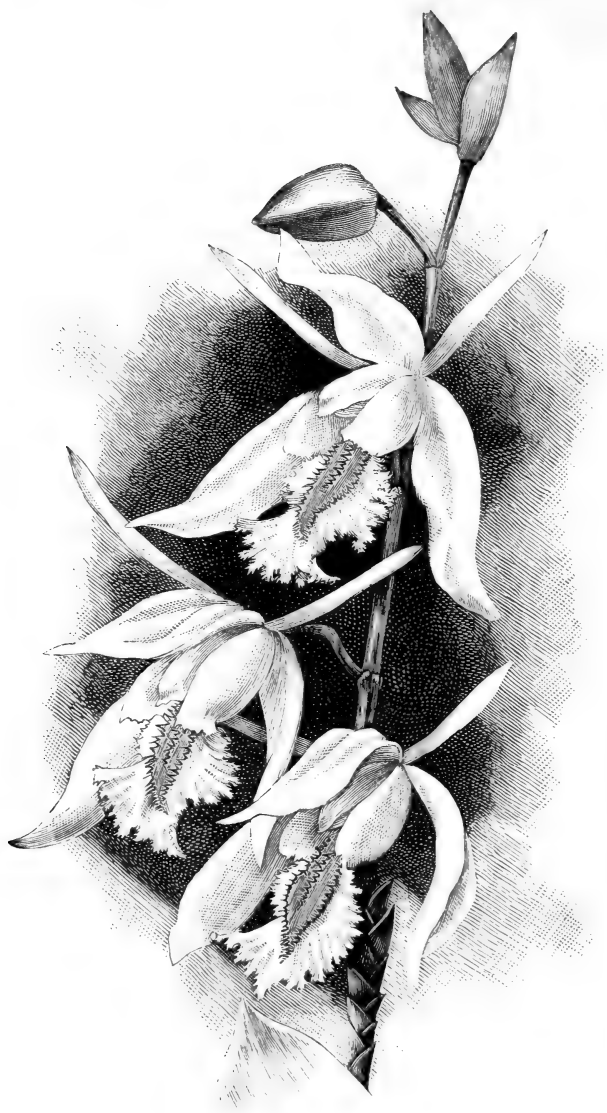


FIG. 142. -CŒLOGYNE SANDERÆ. (*Journal of Horticulture*.)

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